GOULD
Electronics

GOULD

An Electrical/Electronics Company

MANUAL PART NO.
2007-802XXX-XX

2200 SERIES RECORDERS
INK WRITING MODELS

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PRINTED FEB. 1981
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Gould Inc., Instruments Division
3631 Perkins Avenue, Cleveland, Ohio 44114

13TH PRINTING
PRINTED IN U.S.A.

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WARRANTY

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Gould Inc.'s Recording Systems Division's products as shown in the Current Equipment Catalog are warranted for a period of one year from date of shipment to original purchaser. Exceptions: the thermal pen in the 110 Strip Chart Recorder is guaranteed for life; the magnetic head assemblies in the Tape Recorder are warranted for 1000 hours of use or one (1) year from date of first shipment whichever occurs first; and the mainframe computer for Data Acquisition Systems and their associated software programs are warranted for 90 days. The IBM PC-AT computer is warranted for one (1) year.

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10-1-85

Gould instruments are individually tested and calibrated before shipment to assure dependability and verify their accuracy. To this procedure must be added an unseen ingredient of prime importance to you: The Gould concept of continuing service. Gould responsibility for each instrument sold covers far more than its delivery. Of equal concern is the equipment's suitability for its intended purpose, its correct installation, instruction of operating personnel -- plus future servicing and maintenance. The Gould Field Service Department offers customers any or all of these services:

Field Service

- o Installation
- o Field maintenance
- o NBS Certification

Training

- o Instruction of operators
- o On-site training seminars
- o Formal Training courses

Service Contracts

- o Fixed Fee
- o Time and Material
- o Extended Warranty

Our Seal of Pride Gould Inc., Recording Systems Division, and its predecessor organizations tracing back to Charles F. Brush, have been preeminent in instrumentation development since the 1920's. Among Gould's many achievements is a series of the world's best performing, most versatile, and reliable direct writing recording systems.

Today, Gould recorders and signal conditioners are the overwhelming choice for recording analog signals in the most critical industrial, scientific, and biophysical measurement applications. Whether recording the faintest life signals of a patient in a hospital operating room or the most critical variables in the lab or on the production line, you can depend on the accuracy, faithfulness, clarity, and permanence of the traces made by a Gould recorder.

Innovative design, coupled with highest quality, are hallmarks of all Gould products.

The Field Service Engineer Gould field service engineers provide on-the-spot assistance whenever and wherever it is required. While every field service engineer is the product of intensive and thorough factory training, you will find that his greatest strength evolves from field experience and his knowledge of your objectives. He is aware of your problems, is willing and able to assist you in their solution, and is backed by the nation's most experienced organization in recording instrumentation.

Our field service engineers and technicians are daily engaged in the installation, testing, maintenance, repair and inspection of Gould recording systems all over the country. They can provide you with any information about our instruments you may require; if not, they will find the answer to your problem.

Overhaul and Repair Because we service only our own products, our customers can feel confident of prompt, effective results when they turn to Gould Factory Service Centers.

The repair service these centers provide is of particular appeal to those companies that do not operate an instruments repair facility of their own. By designating the nearest Gould Service Center as its maintenance depot, a Gould-equipped company is assured the best chance for continuity of recording instrumentation.

Many companies with their own repair facilities find it more convenient and more truly economical to have their Gould equipment repaired by service contract with the closest Service Center. In addition to enjoying fast turn-around, these companies are spared the expense of carrying an inventory of recorder parts, accessories, and supplies.

Calibration and Certification A small, quiet room in the Standards and Calibration Section at the Gould plant in Cleveland contains precision reference standards just one step removed from the prime reference measurement standards of the United States – at the National Bureau of Standards in Washington. Included in this room which is temperature-controlled within one degree and has a constant relative humidity of 40%, are standards for voltage, frequency (derived from the atomic vibration of caesium), resistance, capacitance -- in fact all basic parameters of electrical measurement. The room is maintained under stabilized conditions 365 days a year.

The calibration practice of all Gould Service Centers is directly traceable to the National Bureau of Standards. We can supply complete calibration for any Gould equipment, and we can also certify to manufacturer's specifications followed by a letter of certification when required.

Training The Gould field service engineer will hold short training courses either on the job or at his facility. On-the-job training is usually a brief, informal session with the people who will actually be operating the Gould equipment.

Formal classroom training is more complete: detailed information, a thorough review of underlying theory, training devices, demonstration of problem solving and examination of students to determine their understanding and proficiency is accomplished at our Cleveland plant.

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Owing to the various requirements of each customer, we do not reproduce here a standard, boilerplate agreement -- which might contain too much or too little. Instead, we tailor each contract to a particular customer's needs. This practice has singlehandedly produced substantial savings in time and money for others; and it can do the same for you.

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SECTION I

GENERAL INFORMATION

1.1 SCOPE

This manual describes the Gould 2200 Series Analog Recorders (Figure 1-1), and provides instructions for installation, operation, troubleshooting, and maintenance. Theory of operation and calibration procedures are also provided. An illustrated parts breakdown is located in the rear of the manual.

Instructions for preamplifiers which may be used with these recorders are contained in their own applicable instruction manuals.

1.2 DESCRIPTION

The 2200 Series Recorder is a high performance analog recorder. It is a self-contained unit housed in a 130mm mainframe chassis to accomodate 1 or 2 isolated recording channels. Each recording channel incorporates frictionless feedback sensors for closed loop control of the pen at high speeds.

Standard to each model are chart speeds of 5, 10, 25, 50, 100, and 200 millimeters per second plus a divide by 100 or 60 (as ordered) for each writing speed. All chart writing speeds are electrically selected by pushbuttons on the front panel. Two standard event markers are provided and are located on the right and left hand margins.

The 2200 Series uses a pressurized ink writing system. The pressurized inking system uses fast drying ink which is applied to specially coated chart paper. The ink is contained in disposable plastic cartridges which can be replaced in minutes. Pen motion is rectilinear.

1.3 MODEL NUMBERING SYSTEM

The model number of the 2200 Series Recorder designates mounting sype, chassis (mainframe) size, number of recording channels, preamplifier cage configuration, type of writing system and variations. The table on the page that follows "Specifications", and "Supplies and Accessories", describes the 2200 Series model numbering system. Appropriate recorder outline dimensionals accompany the model numbering table.

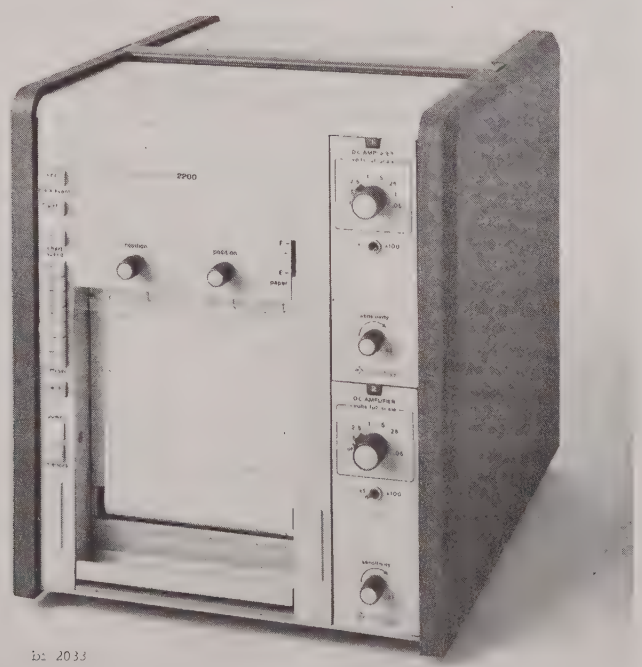


FIGURE 1-1 GOULD 2200 SERIES RECORDER

1.4 SPECIFICATIONS

a. General

Number of Analog Channels ..... One or Two (Depending upon Model Number).

Number of Event Marker Channels ..... Left & Right Margin. Additional is Optional.

Channel Span ..... 50 or 100 mm (Depending upon Model Number).

Trace Presentation ..... Rectilinear.

Trace Width ..... 0.01 inch nominal at 5mm/sec chart speed.

Marking Method ..... Pressured ink.

Marking Fluid Capacity ..... One-ounce replaceable throw away cartridge (sufficient for one year under normal operation).

Chart Speeds ..... 5, 10, 25, 50, 100, and 200 mm/sec plus divide by 60 or 100.

Chart Speed Accuracy ..... ±0.5% synchronous with line frequency.

Chart Length ..... 275 feet (83 meters)

Chart Width ..... 130mm.

Divisions per Channel ..... 50 Divisions on 50mm Channels
100 Divisions on 100 mm Channel

Time Lines ..... Every mm, accentuated at 5 and 100mm.

Chart Travel Dirction ..... Top to Bottom.

Paper Discharge ..... Front

Chart Wander ..... ±0.25 mm.

Operating Temperature Range ..... 0° to +50°C (+32° to +122°F).

Storage Temperature Range ..... -40° to +70°C (-40° to +158°F)

Humidity ..... 95% at 32°C (+90°F) Non-Condensing.

Vibration and Shock ..... Standard Commerical Practice.

Principle Dimensions ..... Refer to Outline Dimensions (Following Model Numbering System Table).

b. Electrical

Input Circuit ..... Single ended, floating (isolated from ground).

Input Impedance ..... 100K ohms ±1% (Recorder without Preamplifiers).

b. Electrical (Cont'd)

Input Signal ..... ±2.5V for full scale deflection of 50, or 100 mm channels.

Frequency Response ..... 100 div @ 100 millimeter amplitude: d-c to 30Hz ±1 div.
50 div @ 50 millimeter amplitude: d-c to 50Hz ±1 div.
40 div @ 40 millimeter amplitude: d-c to 55Hz ±1 div.
10 div @ 10 millimeter amplitude: d-c to 125Hz ±1 div., down less than 3 dB @ 140Hz.

Rise Time (10% to 90% full scale with less than 1% overshoot) ..... At 100 millimeter amplitude: less than 8 milliseconds.
At 50 millimeter amplitude: less than 5 milliseconds.
At 40 millimeter amplitude: less than 4 milliseconds

Non-Linearity ..... ±0.35% of full scale

Pen Position Control ..... Infinitely adjustable ±5 volts d-c. One per channel.

Maximum Allowable Signal Input Voltage to Avoid Damage ..... ±50 volts dc or peak ac (recorder without preamplifiers).

Maximum Safe Common Mode Voltage ..... 500 volts dc or peak ac.

Common Mode Rejection Ratio ..... 60 dB at 60Hz (R_s = 1 kilohm, without preamplifiers).
80 dB at dc (R_s = 1 kilohm, without preamplifiers).

Signal Limiters ..... Built-in adjustable electronic and mechanical.

Zero-Line Instability (Drift) After ..... ±0.1% of full scale for 24 hours.

15 Minute Warm-Up ..... ±0.025% of full scale per ° C.
±0.10% of full scale for ±10% line voltage change.

Gain Instability ..... ±0.1% of reading for 24 hours.
±0.05% of reading per ° C.
±0.05% of reading for ±10% line voltage change.

Remote Chart Drive Start/Stop (Standard on all Recorders) ..... Actuated by an external switch closure at any preselected chart speed.

Internal Timer (Standard on all Recorders) ..... Produces 40 millisecond duration pulses at programmable repetition rates depending upon line frequency as follows:

Line Frequency	Programmable Repetition Rates
50 or 60Hz	0.1, 1, 10 and 100 second; 0.01, 0.1 and 1 minute
400 Hz	0.1, 1 and 10 second; 0.001, 0.01 and 0.1 minute

Power Consumption ..... 50 to 60Hz: 160VA +50VA per channel (100W+41W per channel) 400Hz: 300VA+50VA per channel (200W+41 W per channel).

1.5 SUPPLIES AND ACCESSORIES

a. Supplies

Chart Paper (All Models)
High Contrast, Kromekote (275 feet) 1 mm time line
1-100 mm channel 11-2913-30
2-50 mm channels 11-2923-35
2-50 mm channels (400 ft. long - reproducible) 11-2923-46

Analog Pen
(includes ink tube, lapping paper, and pen pressure adjustment wrench.) 11-2823-42

Event Marker Pen 267884-5

Ink Tube (Event Marker Pen) 667447-1

Ink Cartridge (1oz.Blue Ink) 11-2730-01

Gram Gage 240601-910

b. Accessories

Starter Kits
Starter kits include 12 rolls of high contrast chart paper, gram gage, one analog pen, lapping paper and pen pressure adjustment wrench. Below are starter kit model numbers.

2-50 mm channels 11-6250-13
1-100 mm channel 11-6250-14

Drive Amplifier Extender Card 887526

Pen Pressure Adjustment-Wrench 1-120922-18

Band, Penmotor 684999

Ink Tube Replacement Tool 267528

Rack Mounting Kits (For Conversion of Portable Units)
2200 Series with Preamp cage 11-1202-16
2200 Series without Preamp cage 11-1202-17

Mobile Carts 11-6405-02

Chart Takeup 11-6402-13

Interchannel Event Marker (includes pen when ordered with recorder) 887181

500 Watt Portable Isolation Transformer (for patient care applications) 882895-3 (115Vac)
882895-4 (230 Vac)

TABLE 1-1 2200 SERIES MODEL NUMBERING SYSTEM

MODEL NUMBER **CODE DESCRIPTION**

2007-XXXX-XX

Operating Voltages

00	115V + 10%, 60 Hz, divide by 100 chart speeds
05	115V + 10%, 50 Hz, divide by 100 chart speeds
06	230V + 10%, 50 Hz, divide by 100 chart speeds
10	115V + 10%, 60 Hz, divide by 60 chart speeds
15	115V + 10%, 50 Hz, divide by 60 chart speeds
16	230V + 10%, 50 Hz, divide by 60 chart speeds

Type of Mounting and Preamplifier Cage Configuration

00	Portable case for recorder only
02	Portable case and two-preamp cage
70	Rack mounting kit, recorder only
72	Rack mounting kit, two-preamp cage

Number of Channels

21	One 100 millimeter channel, chassis asm., drive amp and timer
22	Two 50 millimeter channels, chassis asm., drive amps and timer

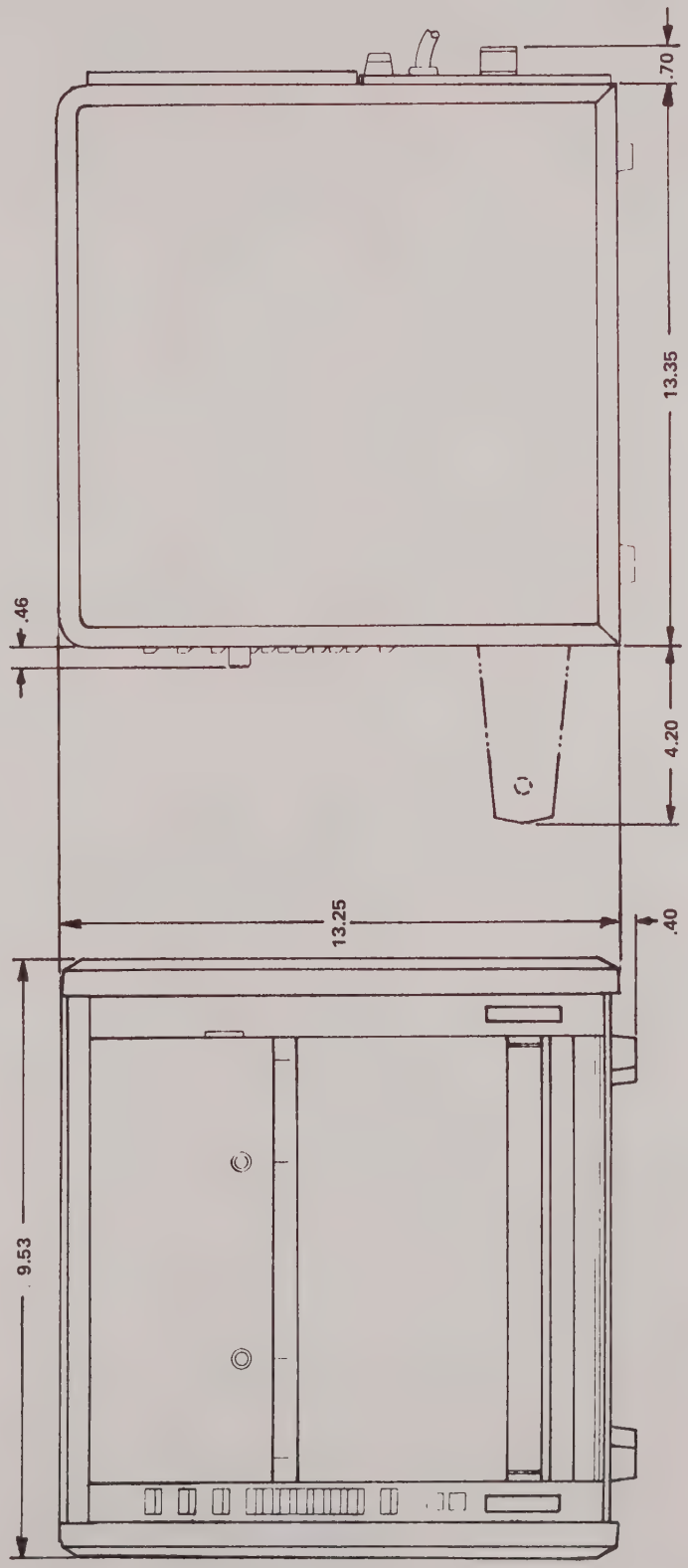


FIGURE 1-2 OUTLINE DIMENSIONS - 2200 SERIES

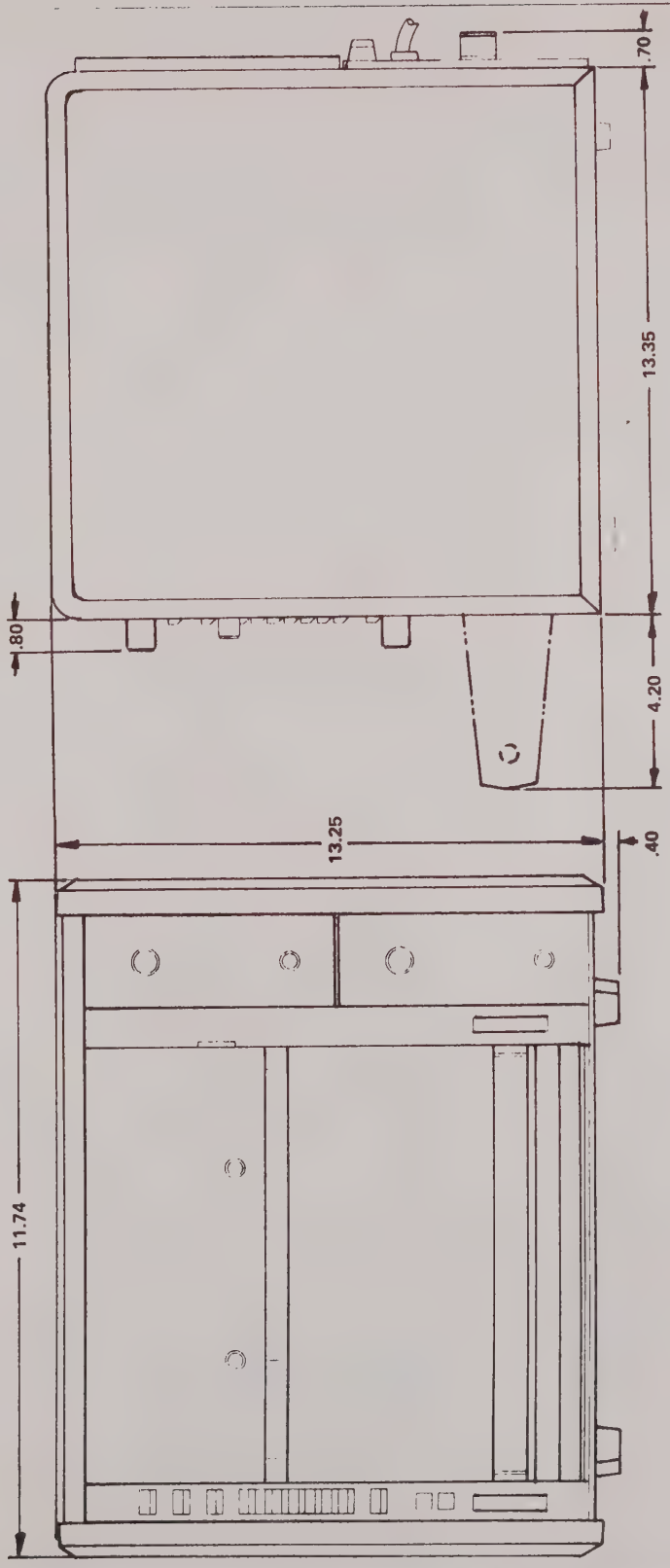
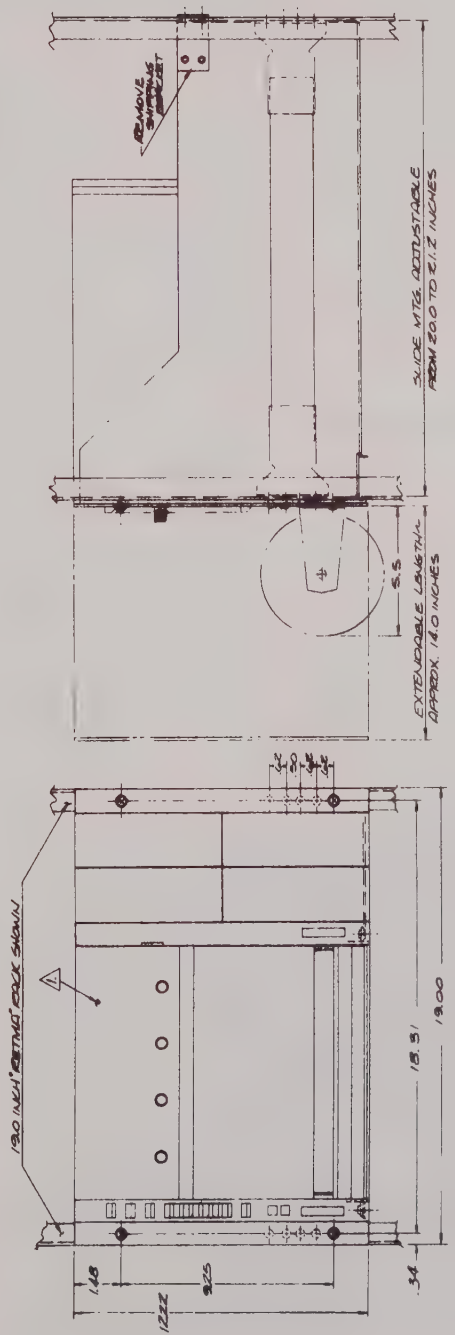


FIGURE 1-3 OUTLINE DIMENSIONS - 2200 SERIES WITH PREAMPS



1. FRONT VIEW OF 2007-4474-XX IS SHOWN. DIMENSIONS REMAIN THE SAME FOR ALL OTHER RACK MOUNTED VERSIONS OF 2200 & 2400 RECORDERS.

FIGURE 1-4 OUTLINE DIMENSIONS – 2200 SERIES RACK MOUNT

SECTION II

INSTALLATION

2.1 GENERAL

This section contains information necessary to put the recorder into service, including installation of optional equipment.

2.2 SERVICE UPON RECEIPT

CAUTION: POWER MUST BE OFF DURING THE FOLLOWING SEQUENCE.

Before making signal connections and applying power to the recorder, the following service must be performed:

1. Remove sheet of chart paper from under pens and load roll of chart paper as described in Section VI.

2. Slide all manual ink valves with tubing attached to ON position. (Follow direction of arrows on manifold bar.) Valves are located on top of recorder. Remove the recorder top front cover to gain access to valves. Slide cover forward and lift out. (If recorder is rack mounted, slide recorder out of rack.

3. Ink cartridge and ink solenoid valve is turned on prior to shipment from factory.

NOTE: Ink cartridge should be near full.

4. Place cover back in position (or slide recorder back into rack and secure).

2.3 LINE VOLTAGE REQUIREMENTS

The last digit of the model number designates line voltage and frequency. Listed below are last digit of model number and line voltage and frequency required.

DIGIT	LINE VOLTAGE & FREQUENCY
0	115 vac @ 60 Hz
4	115 vac @ 400 Hz
5	115 vac @ 50 Hz
6	230 vac @ 50 Hz

2.4 ANALOG SIGNAL CONNECTIONS

a. Without Preamplifiers

On recorders not supplied with preamplifiers, signal input connections are made directly to pen drive amplifiers. Two phone jacks are provided on each drive amplifier. They are located on the rear of the recorder (Figure 2-1). Use shielded cable (Belden 8422 or equal). Tip is high; ring is low; barrel is common.

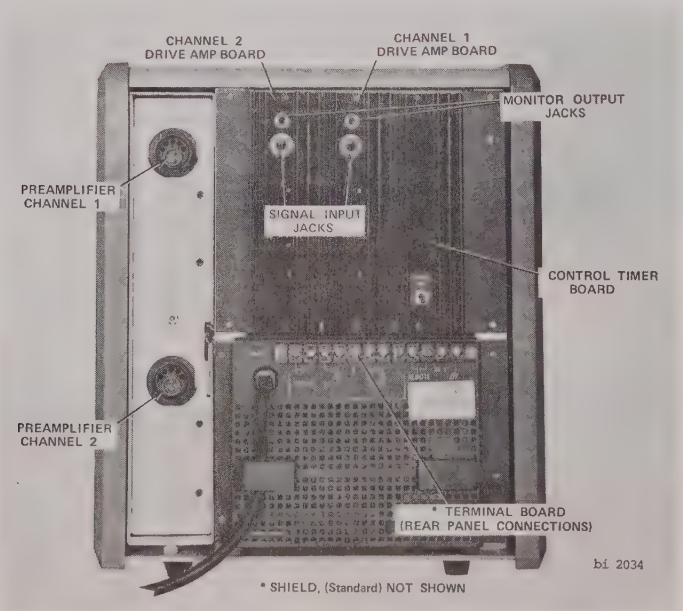


FIGURE 2-1 SIGNAL INPUT CONNECTIONS

b. With Preamplifiers

On recorders supplied with preamplifiers, signal input connections are made via a connector located in the preamplifier cage. Refer to applicable preamplifier manual for their signal input connections.

2.5 EVENT MARKER INPUTS

a. Standard Event Markers

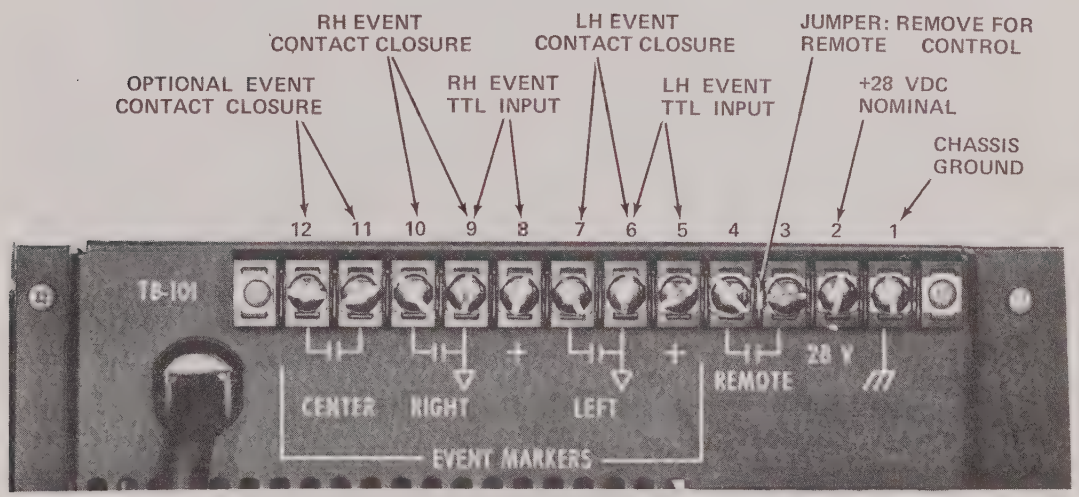
Left and right markers are standard. Actuation is made by momentary switches on front panel or externally via the terminal strip located on recorder rear panel. External actuation may be made by contact closure or TTL signal input. Refer to Figure 2-2 for connections.

b. Optional Event Marker

Interchannel optional event marker is actuated by a contact closure via the rear panel terminal strip. Refer to Figure 2-2 for connections.

2.6 REMOTE CHART DRIVE (Stop/Start)

For remote chart drive operation, remove jumper between pins 3 and 4 on rear panel terminal strip. A contact closure across these pins will remote enable chart drive motor. Refer to Figure 2-2. Chart SPEED must be preselected.



NOTE: "L" SHAPED SHIELD, STANDARD, (not shown) PROTECTS TERMINAL BOARD.

bi 2035

FIGURE 2-2 REAR PANEL TERMINAL CONNECTIONS

2.7 CHART TAKEUP INSTALLATION

Refer to Figure 2-3, and install the optional chart takeup as follows:

1. Disconnect recorder from power source.
2. Remove case from recorder as described in Section VI (or slide reocrder about 6 inches out of rack).
3. Remove plastic caps covering slots in front panel.
4. Position chart takeup on front panel with drive belt on left side. Secure with screws and lockwashers.
5. Slide pulley onto drive roll shaft, and secure with cotter pin.
6. Position drive belt over pulley.
7. Reinstall case.

2.8 RACK MOUNTING KITS

Rack mounting kit for recorder only is Model 11-1202-17; for recorder with 2 channel preamp cage use Model 11-1202-16. Installation instructions are included with each kit.

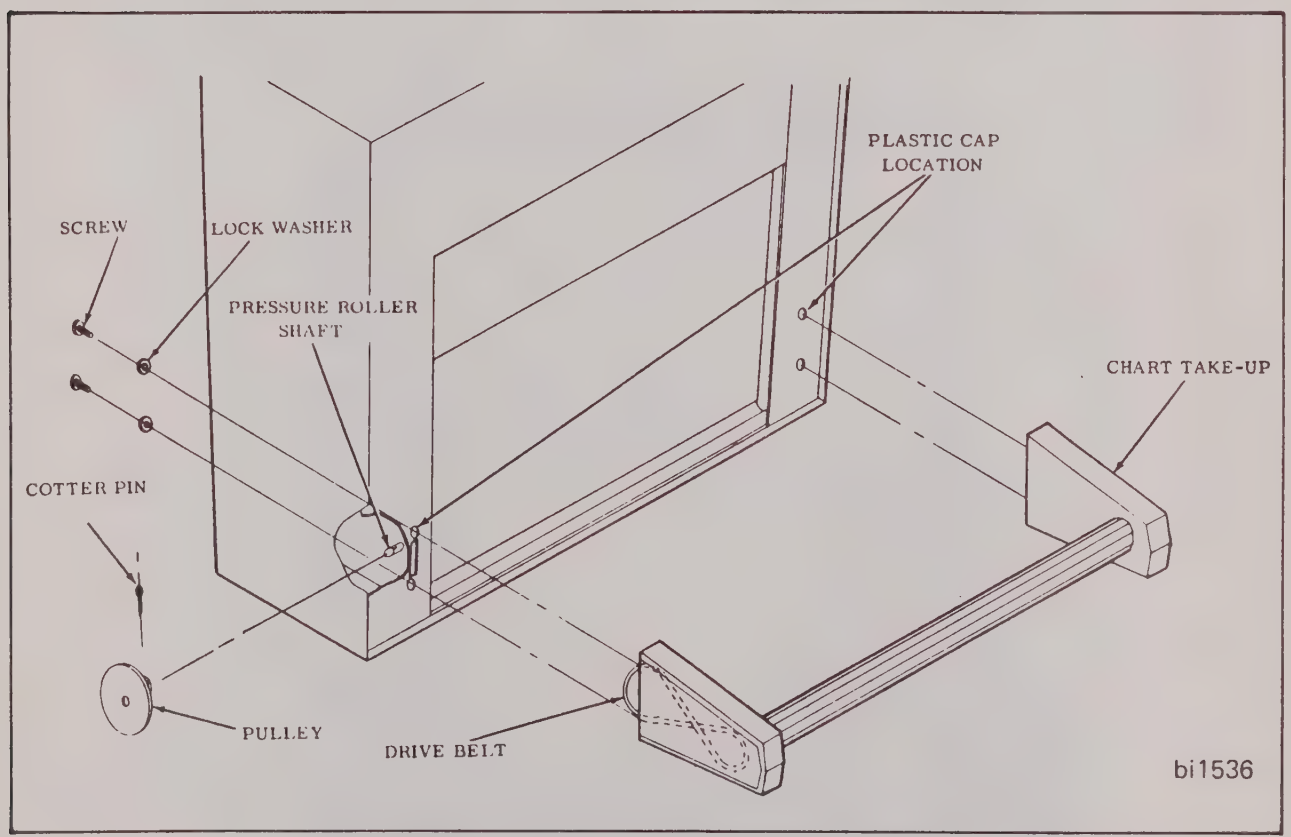


FIGURE 2-3 CHART TAKEUP INSTALLATION

SECTION III

OPERATION

3.1 GENERAL

This section provides complete instructions for operation of the recorder. Functional descriptions of the controls and indicators are provided. If the recorder is equipped with preamplifiers, refer to their applicable instruction manuals for operating instructions.

3.2 FRONT PANEL CONTROLS & INDICATORS

Figure 3-1 illustrates the front panel controls and indicators. The following list corresponds to the items called out on Figure 3-1.

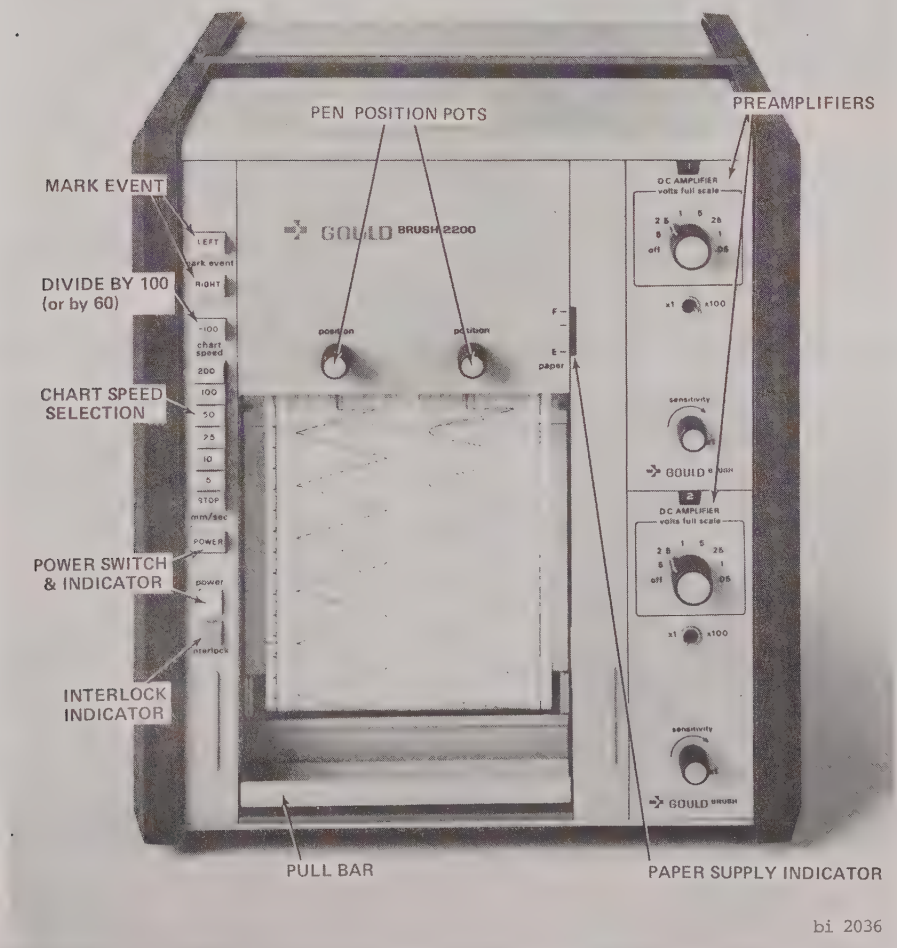
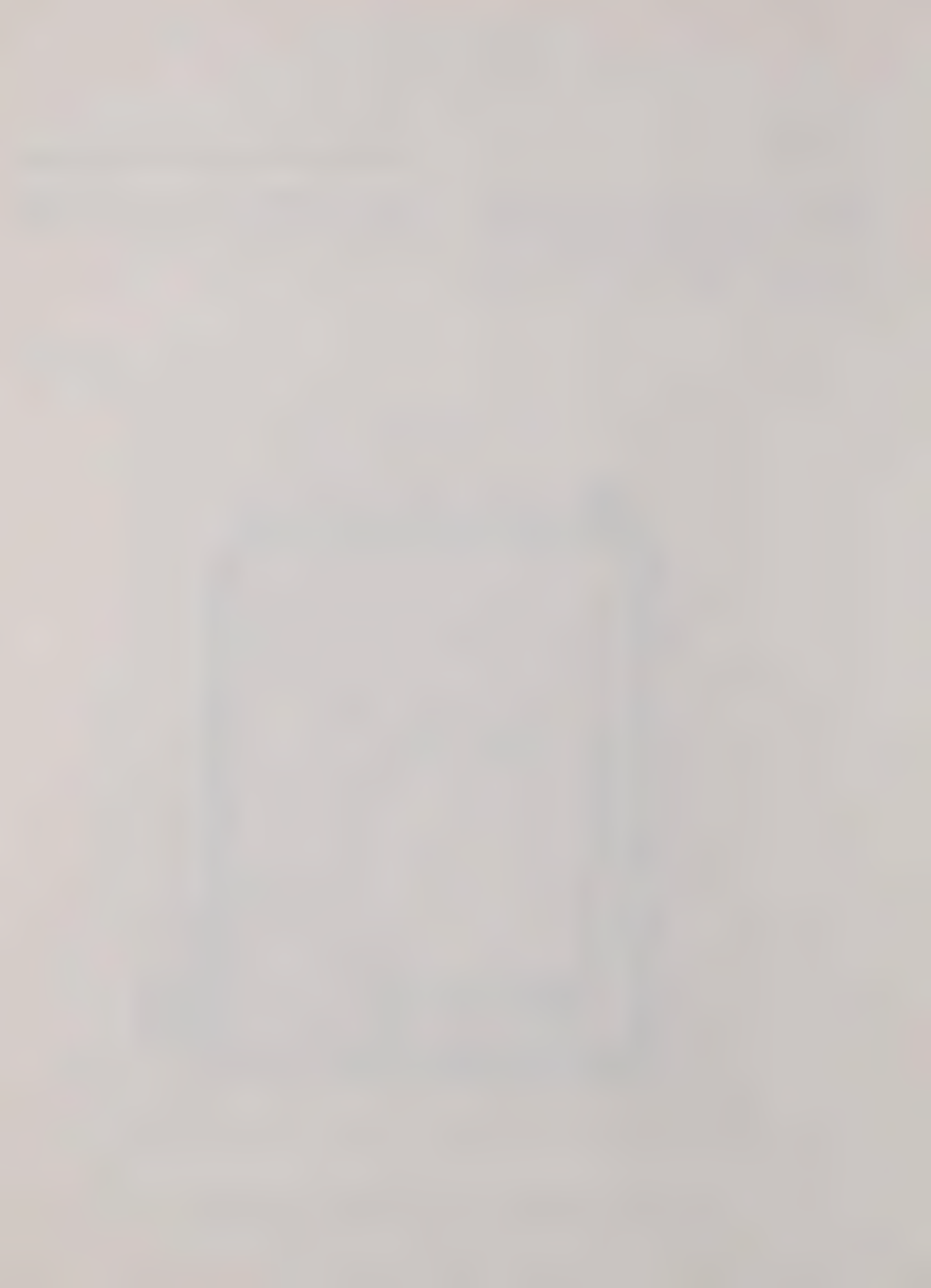


FIGURE 3-1 FRONT PANEL CONTROLS & INDICATORS



CONTROLS	DESCRIPTION
POWER SWITCH	Controls AC to recorder. Depress to turn recorder ON or OFF. POWER lamp illuminates when recorder is ON.
CHART SPEED SELECTION	Permits selection of six chart speeds and STOP. When in STOP position chart drive is off, and pens will not respond to input signals. Depressing any chart speed button will activate the chart drive at the selected speed. Chart speeds may be changed while chart drive is running.
DIVIDE BY 100 (or by 60)	When depressed, chart speeds become 0.05, 0.10, 0.25, 0.50, 1.0, and 2.0 mm/second (divide by 60 becomes 5, 10, 25, 50, 100, and 200 mm/minute).
MARK EVENT	Two momentary switches permit manual marking of an event. When left MARK EVENT button is depressed the left event marker pen will deflect to the left. When the right MARK EVENT button is depressed the right event marker pen will deflect to the left. **NOTE: The EVENT MARKER pens will remain deflected until the mark event button is released.**
PEN POSITION POTS	Permits pen positioning anywhere within the channel.
PULL BAR	Pull to gain access to chart paper supply roll.
INTERLOCK INDICATOR	Lamp illuminates when writing table is not completely closed or paper supply is exhausted.
POWER INDICATOR	Lamp illuminates when POWER switch is depressed.
PAPER SUPPLY INDICATOR	Gauge to indicate quantity of chart paper remaining.
PREAMPLIFIERS	Refer to applicable Preamplifier manuals for operating instructions.

3.3 REAR PANEL

Figure 3-2 illustrates the recorder rear panel. The following list corresponds to the figure.

CONTROLS	DESCRIPTION
PREAMP CAGE	Houses preamplifiers if part of the recorder system.
SIGNAL INPUT	Jacks for signal input direct to drive amplifiers.

CONTROLS	DESCRIPTION
TERMINAL STRIP	Refer to Section II for connections.
TIMER	ON/OFF toggle switch for timed left hand event marker activation.
MONITOR JACK	Monitors output of preamplifier (regardless of chart display). For use on Scope, Meter, Output panel, etc.

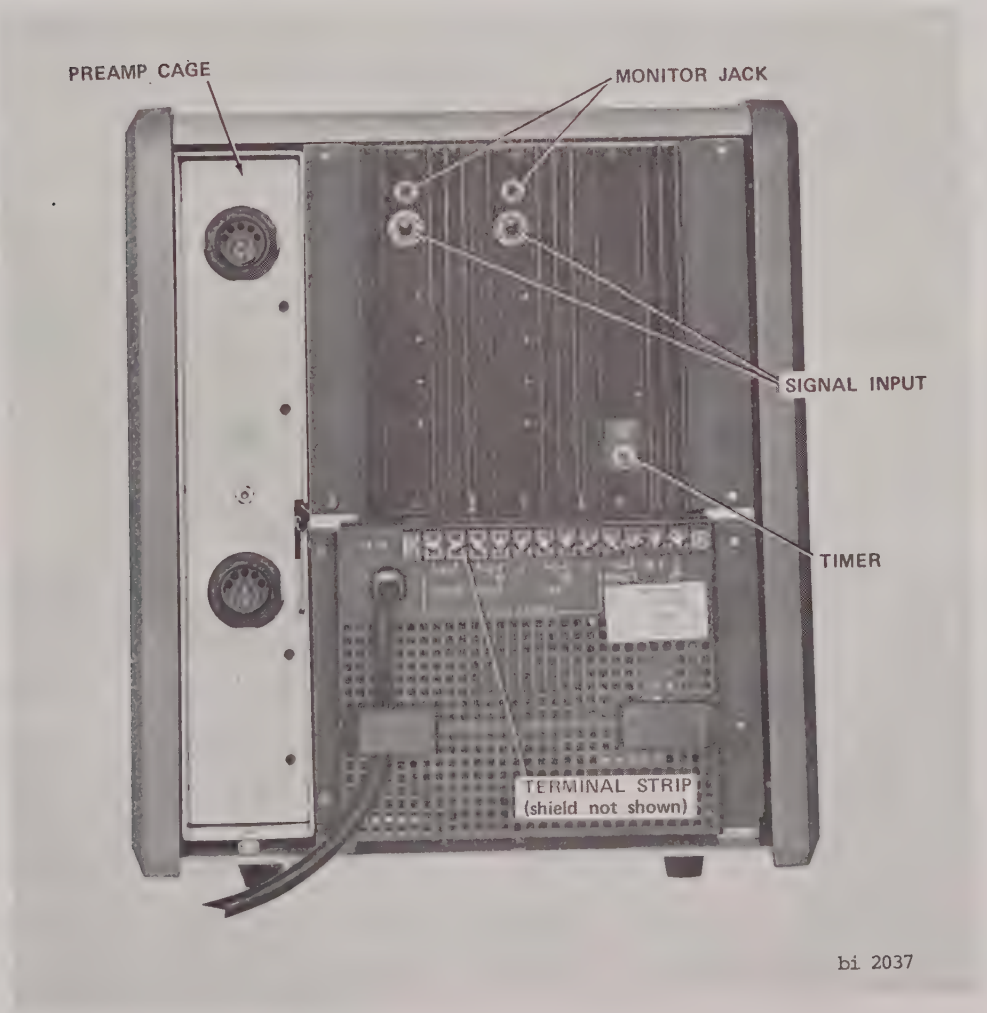


FIGURE 3-2 REAR PANEL

3.4 TIMER SETTING

The timer actuates left event markers at programmed repetition rates. Selection of repetition rates is made via switch S-104 on the control board. Set rate as follows:

1. Turn recorder power OFF.
2. Loosen the two screws which secure the control board and pull out of the recorder.
3. Set switch positions for desired repetition rate per Table 3-1.

NOTE: Use switch positions for line frequency recorder operates on.

4. Replace control board and secure with screws.
5. Turn recorder power ON.
6. Turn TIMER switch ON. Timer ready for operation.

3.5 SETUP AND OPERATION

Prepare recorder for operation as follows:

CAUTION: MAKE SURE ALL PROCEDURES DESCRIBED IN SECTION II, INSTALLATION HAVE BEEN PERFORMED.

1. Check paper supply level. Make sure an adequate supply present for length of time recorder is to be operated and it is properly threaded.
2. Make sure chart STOP pushbutton is depressed.
3. Depress POWER pushbutton. POWER lamp should illuminate.
4. Depress 5mm/sec chart speed pushbutton, and allow chart to travel about one foot. If no pen trace is present, refer to Section VI.
5. Set pen to show full scale deflection within channel limits.
6. Apply input signal to recorder.
7. Set chart SPEED to that which will best display signal.

TABLE 3-1. SWITCH SETTINGS VS TIMER REPETITION RATE FOR VARIOUS POWER LINE FREQUENCIES

REPETITION RATE	60 HZ LINE		50 HZ LINE		400 HZ LINE	
	SW ON	SW OFF	SW ON	SW OFF	SW ON	SW OFF
0.1 SECOND	2,3,5	1,4,6,7,8	1,3,5	2,4,6,7,8	3,6	1,2,4,5,7,8
1.0 SECOND	2,3,6	1,4,5,7,8	1,3,6	2,4,5,7,8	3,7	1,2,4,5,6,8
10.0 SECONDS	2,3,7	1,4,5,6,8	1,3,7	2,4,5,6,8	3,8	1,2,4,5,6,7
100.0 SECONDS	2,3,8	1,4,5,6,7	1,3,8	2,4,5,6,7	—	———
0.01 MINUTE	2,4,6	1,3,5,7,8	1,4,6	2,3,5,7,8	4,7	1,2,3,5,6,8
0.10 MINUTE	2,4,7	1,3,5,6,8	1,4,7	2,3,5,6,8	4,8	1,2,3,5,6,7
1.00 MINUTE	2,4,8	1,3,5,6,7	1,4,8	2,3,5,6,7	—	———

SECTION IV

THEORY OF OPERATION

4.1 GENERAL

The 2200 Series Recorder is a modular-constructed unit consisting of a 130mm (total chart width) mainframe and 1-100mm or 2-50 mm analog recording channels. Each channel is electrically identical. Figure 4-1 illustrates a block diagram of the basic recorder.

Preamplifiers are optional and are discussed in their respective instruction manuals.

4.2 MAINFRAME

The mainframe contains a switchboard, control board, control transformer, chart drive motor and transmission and event markers.

a. Switchboard

The switchboard is mounted on the left side of the front panel. It contains the operator controls: switches for POWER ON/OFF, CHART SPEED selection, and EVENT Marker actuation; and indicators for POWER ON and INTERLOCK.

The **POWER switch** is a set-reset pushbutton which interrupts both phase and neutral sides of the ac power line.

Chart speed selection is made by depressing one of six SPEED, a DIVIDE, or STOP pushbutton. The SPEED and STOP pushbuttons are mechanically interlocked to reset a previously selected pushbutton. The DIVIDE is a set/reset pushbutton. A combination of three transmission solenoids are activated by the SPEED pushbuttons to obtain the desired chart speed. Table 4-1 defines chart speed versus solenoid activation. Each chart speed may be divided by 60 or 100 (depending upon model number) by depressing the DIVIDE pushbutton. This activates solenoid L101. The STOP pushbutton interrupts power to the motor/transmission via relay K-101 and reset the SPEED pushbuttons.

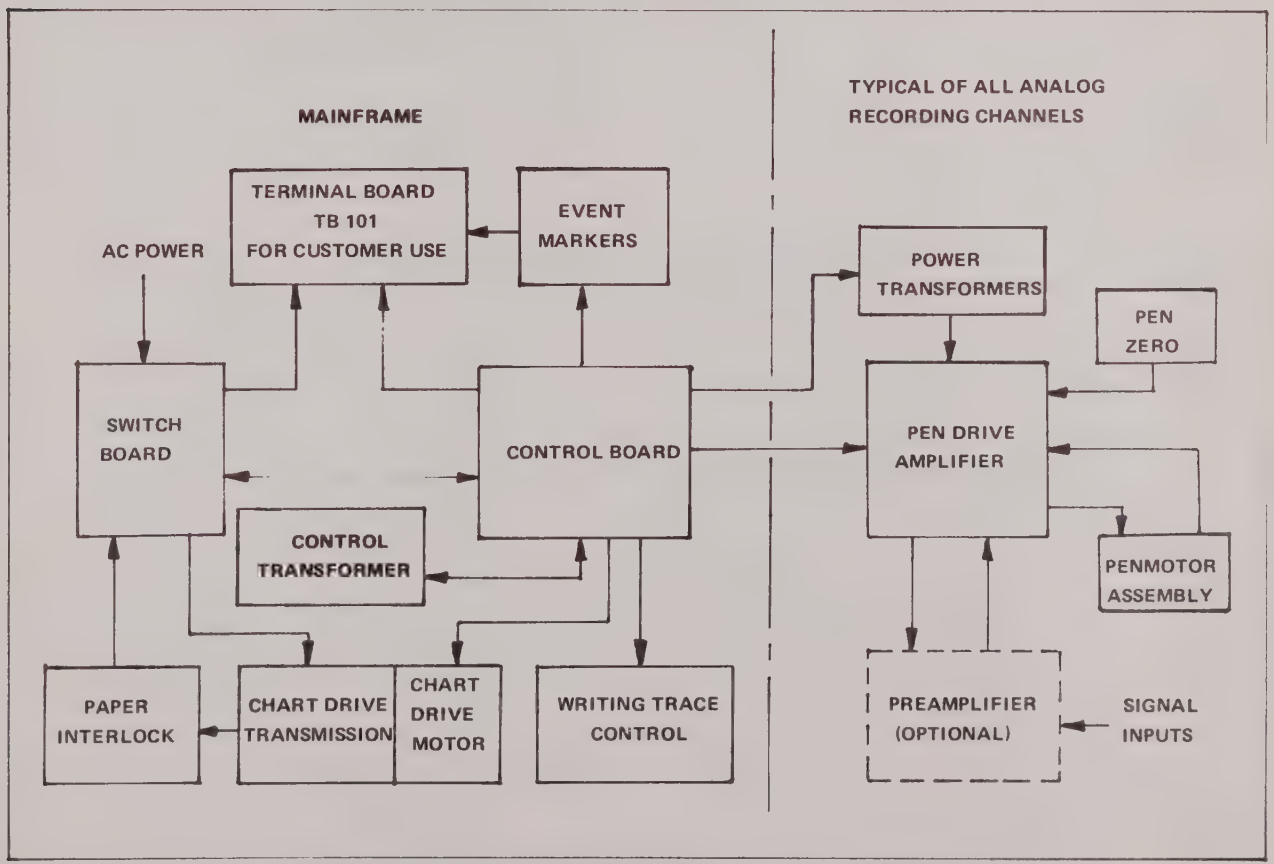


FIGURE 4-1 BASIC RECORDER BLOCK DIAGRAM

When the LEFT or RIGHT MARK EVENT push-buttons are depressed, solenoids L108 and L109 respectively, are energized activating the left or right event markers. These are momentary push-buttons, and reset when released.

TABLE 4-1
CHART SPEEDS VS SOLENOID ACTIVATION

CHART SPEED (MM/SEC)	SOLENOID ACTIVATED L-102	L-103	L-104
5.0	X	X	
10	X		X
25		X	X
50		X	
100			X
200			

NOTE: Divide by 100 (or 60) activates L-101.

b. Control Board

The control board is mounted in the card cage in the rear of the recorder. Contained in the control board are the branch fuses, start/stop relay K-101, the +5Vdc and +28Vdc power supplies, and timer.

Fuses are provided to protect each power branch. Table 4-2 shows fuse and circuit protected.

DPDT relay K101 controls power to the chart drive motor, ink solenoids, standard event markers, and optical couplers located in the pen drive amplifiers. It is energized when the chart STOP push-button is released. When energized, one set of contacts supplies power to the chart drive motor thru fuse F112 and activates the ink manifold solenoid. When de-energized, the other set of contacts inhibit the event markers and optical couplers in the pen drive amplifier(s).

The control board contains two dc power supplies: +28V and +5V. The +28Vdc power source is obtained from bridge rectifier CR102 and control transformer T109. The unfiltered section of this section of the supply provides power to relay K101, optional event marker solenoids, and the indicator lamps. The filtered section of this supply provides power to the standard event markers to insure accuracy when precise time events are required. The +5Vdc power source is obtained thru CR102 from a second winding on control transformer T109. This supply is filtered and regulated to provide power for the pen drive amplifier optical couplers and timer.

Pulsating dc voltage is provided from bridge rectifier CR101 to operate the ink supply solenoids.

TABLE 4-2 FUSE VS CIRCUIT PROTECTED

FUSE	CIRCUIT PROTECTED
F101, (F102)	Analog channel power transformers T101 (and T102).
F109	Control transformer T109 which supplies power for the +5V and +28V dc power supplies.
F111	Ink solenoid
F112	Chart Drive Motor

The timer operates as a function of ac line frequency. Optical coupler U107 shapes the sinusoidal wave into a square wave. Binary counters U102 thorugh U105 count the square wave pulses. Switch S104 selects combinations of U102 through U105 for the output pulse repetition rate (time interval) desired. The output pulse drives monostable multivibrator U106. Output from U106 turns on Q102 or Q103, activating the left event markers. (See Table 3-1).

c. Event Markers

Left and right standard event markers are activated by the MARK EVENT switches, optional timer, or remote application of TTL signals or contact closure. Depressing a MARK EVENT switch permits current to flow from CR106 through the mark event solenoid, activating the event marker.

NOTE: TTL and switch closure are described for left event marker only. Right event marker is identical.

Placing a switch closure (short) across terminals 6 and 7 of TB101, permits current to flow from CR-106 through the mark event solenoid, activating the event marker. Application of a TTL signal across terminals 5 and 6 of TB101, causes Q101 to conduct, activating the event marker.

4.3 ANALOG RECORDING CHANNELS

a. General

Each analog recording channel consists of a power transformer, pen drive amplifier, and penmotor. The channels are isolated from one another by using separate transformer power supplies and optical couplers. The optical coupler disables the pen drive amplifier whenever relay K101 on the control board is de-energized from depressing chart STOP pushbutton or upon loss of ac power.

Each power transofrmer has two primary and three secondary windings. The primary windings can be wired in parallel for 115vac operation or in series for 230 vac operation. Two of the secondary windings (±35 and ±15 volts) provide power for the pen drive amplifier. The third (13Vac—may be used in preamplifiers requring isolated power supplies for bridge excitation or suppression.

Figure 4-2 shows a block diagram of an analog channel. The penmotor drive amplifier is a complete servo system and uses a linear voltage displacement transformer (Metrisite*) in the penmotor to develop position, and a velocity transducer for velocity. These signals are summed with the input signal in a dc error amplifier which, after amplification, drives the penmotor.

b. Signal Limiter

The input signal enters the signal limiter and is summed with the pen zero signal. The summed signal is fed to a diode bridge circuit. Output from the bridge is limited to ±2.6 volts.

c. Frequency Compensation Network

Output from the signal limiter is fed to a frequency compensation network. Here, the signal's frequency response is adjusted to be flat within 2% from dc to 65 Hz pen deflection and from dc to 125 Hz for 10 division pen deflection. The frequency compensated signal is then fed to summing network where it is combined with error and velocity signals.

d. Oscillator and Demodulator

Position feedback is obtained from the Metrisite. Excitation for the Metrisite is obtained from a 20 KHz Wein Bridge Oscillator. A demodulator attenuates the 20KHz carrier. Output from the demodulator is the position feedback signal.

e. Servo Control Amplifier

The compensated input signal, position feedback, and velocity are summed at the input of the servo amplifier. The output of this stage drives a Class B amplifier, which drives the pen to the proper position on the chart. This occurs when the summed signal is reduced to zero.

*Registered Trademark of Gould Inc.

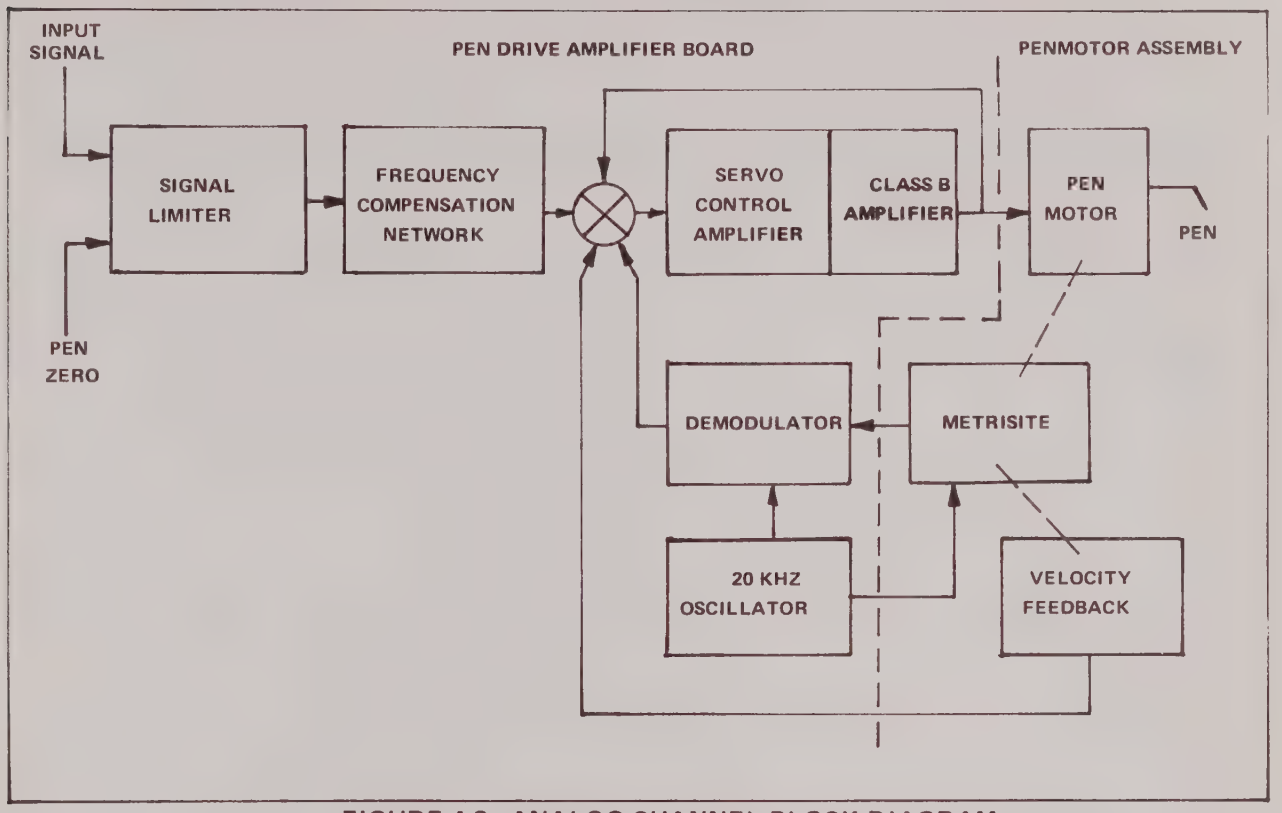


FIGURE 4-2 ANALOG CHANNEL BLOCK DIAGRAM

SECTION V

TROUBLESHOOTING

5.1 GENERAL

This section provides troubleshooting hints to assist the operator and/or serviceman in locating malfunctions that are the possible causes and remdy. If a problem exists which is not identified in this section, contact the factory for assistance.

5.2 ELECTRICAL POWER MALFUNCTIONS

MALFUNCTION	CAUSE	REMEDY
1. Recorder inoperative (Power ON and INTER-LOCK Lamps are extinguished with POWER ON switch depressed.	a. Recorder not connected to power source.	a. Connect to power source.
	b. Fuse F109 blown.	b. Replace fuse.
	c. POWER ON switch defective.	c. Replace switch.
2. Recorder Inoperative (POWER ON and INTER-LOCK Lamps are illuminated.	a. Chart Paper torn or supply is depleted.	a. Rethread or replace chart paper.
	b. INTERLOCK switch defective.	b. Replace switch

5.3 CHART DRIVE MALFUNCTIONS

MALFUNCTION	CAUSE	REMEDY
1. Inoperative	a. Desired Chart SPEED button not depressed.	a. Depress desired chart speed button.
	b. Drive belt worn or broken.	b. Replace drive belt.
	c. Jumper between pins 3 & 4 of TB101 missing.	c. Replace Jumper.
	d. Fuses F111 or F112 blown.	d. Replace Fuse.
	e. Motor defective.	e. Replace motor.
	f. Chart speed switch defective.	f. Replace switch board assy.
	g. Relay K101 defective.	g. Replace relay.
2. Operative on only some speeds.	a. Chart speed switches defective.	a. Replace switch board assy.
	b. Transmission defective.	b. Replace transmission.
	c. Broken wire on transmission terminal.	c. Repair connection.

5.3 CHART DRIVE MALFUNCTIONS (Continued)

MALFUNCTION	CAUSE	REMEDY
3. Inoperative on divide by 100 (or 60) speed.	a. Transmission defective.	a. Replace transmission.
	b. Switch defective.	b. Replace switch.
	c. Broken wire to transmission.	c. Replace wire.
4. Chart speed not accurate or is erratic.	a. Drive roll worn excessively.	a. Clean or replace drive roll.
	b. Transmission defective.	b. Replace transmission.

5.4 WRITING SYSTEM MALFUNCTIONS

MALFUNCTION	CAUSE	REMEDY
1. Trace missing or faint.	a. Ink supply exhausted.	a. Replace ink cartridge.
	b. Screw on ink cartridge not fully counterclockwise.	b. Turn screw fully counterclockwise.
	c. Ink manifold valves not in full ON position.	c. Rotate to full ON position.
	d. Pens clogged.	d. Clean or replace pens.
	e. Ink manifold solenoid defective.	e. Replace solenoid.
	f. Ink manifold solenoid de-energized.	f. Fuse F112 blown: replace fuse.
	g. Air in System.	g. Bleed System.
2. Trace heavy or wet; pen gouges paper.	a. Pen excessively worn.	a. Replace pen.
	b. Pen not properly lapped	b. Lap pen.
	c. Improper pen pressure.	c. Adjust pen pressure.
3. All pens not on same time line.	a. Pen (s) out of alignment.	a. Align Pen (s).
4. Pen fails to return to same position each time.	a. Loose pen.	a. Align and tighten pen.
	b. Loose penmotor linkage.	b. Replace penmotor.

5.5 SIGNAL MALFUNCTIONS

MALFUNCTION	CAUSE	REMEDY
1. Trace unusually wide.	a. Noise appearing at the pen tip.	a. Check input signal and connections. Defective drive amplifier or preamplifier boards; repair or replace.
2. No signal on any or all channels.	a. Drive amplifier or preamplifier defective.	a. Replace drive amplifier or preamplifier.
	b. Drive amp fuse (s) blown.	b. Replace fuse (s) after correcting malfunction.
	c. Chart speed stop switch defective.	c. Replace switch.
3. Pens limp or biased to either side.	a. Drive amplifier or preamplifier defective.	a. Repair or replace drive amplifier or preamplifier.
	b. Recorder requires calibration.	b. Calibrate recorder.
	c. Pen loose.	c. Align and tighten pen.
	d. Defective pen position pot.	d. Replace pen position pot.

SECTION VI

MAINTENANCE

6.1 GENERAL

This section contains information for use in preventive and corrective maintenance of the 2200 Series Recorder. Refer to Section V, Troubleshooting for guidelines in localizing problem areas.

6.2 CLEANING

a. General Cleaning

CAUTION: AVOID USE OF CHEMICAL CLEANING AGENTS WHICH MIGHT DAMAGE PLASTIC OR PAINTED SURFACES. DO NOT USE CHEMICAL WHICH CONTAIN TOLUENE, ACETONE, OR SIMILAR SOLVENTS.

EXTERIOR: Remove loose dust with a soft cloth or small paint brush. Dirt which remains can be removed with a soft cloth dampened in a mild detergent and water solution. Do not use abrasive cleaners.

INTERIOR: Dust in recorder interior should be removed ocassionally due to its electrical conductivity under high-humidity condtions. Blow off accumulated dust with dry, low-pressure air. Remove any dirt which remains with a soft paint brush or a soft cloth dampened in a mild detergent and water solution. A cotton-tipped applicator is useful for cleaning in narrow spaces and/or printed circuit boards.

b. Ink Removal

CAUTION: USE ONLY GOULD INK REMOVER (P/N 282920) TO REMOVE SPILLED INK. THE USE OF OTHER INK REMOVING SOLVENTS IS NOT RECOMMENDED.

1. Blot up any excess ink with a tissue or paper towel.
2. Apply ink remover P/N 282920) to the inked area ONLY. DO NOT attempt a general cleaning.
3. Gently rub the area with a soft cloth until the ink spot is removed.
4. Wipe the area thoroughly with a damp cloth.
5. Allow cleaned area to dry at least ten minutes before using recorder.

6.3 CHART PAPER REPLACEMENT

1. Depress chart STOP pushbutton and release power pushbutton.
2. Grasp pull bar (Figure 6-1) and open writing table.

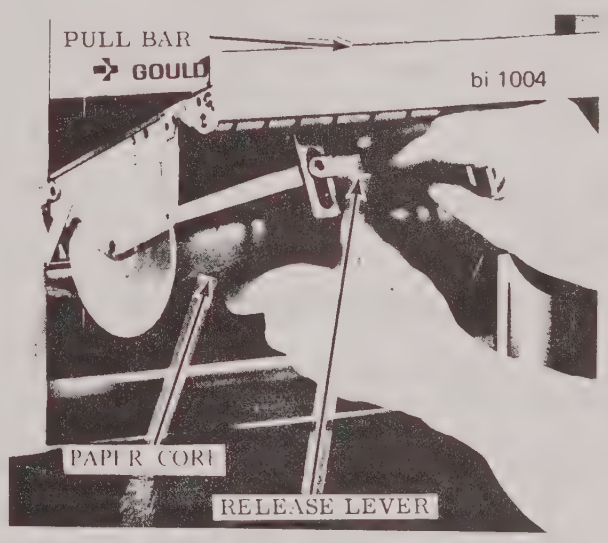


FIGURE 6-1 PAPER ROLL REMOVAL

3. Hold paper supply roll and pull down on paper supply release lever. Remove paper supply roll.
4. Unscrew right flange from paper supply roll. Remove and discard core (Figure 6-2).
5. Slide new paper roll onto supply shaft. Make sure notches in paper core align with guide pins on left flange and paper edge is facing forward and down.
6. Screw right flange onto supply shaft until it is snug against paper edge.
7. Insert paper roll into writing table assembly. Push release lever up to lock into position.

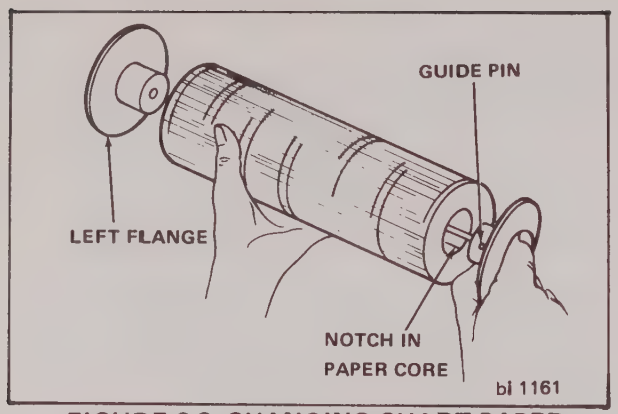


FIGURE 6-2 CHANGING CHART PAPER

CAUTION: MAKE SURE SHAFT IS SEATED PROPERLY AND ROTATES FREELY. USE CARE WHEN THREADING PAPER SO NOT TO DAMAGE PENS.

8. Refer to Figure 6-3. Feed paper over writing bar, down through slot between pull bar and drive roll, around pressure roll, and out to front of writing table assembly.

9. Slowly close writing table while gently pulling on chart paper. When friction resists rotation of paper roll, pull paper taut and center, and close writing table assembly. Make sure table is completely closed.

10. Turn recorder on and run out about two feet of chart paper at 100 mm/sec to align on writing table.

6.4 PEN PRESSURE MEASUREMENT

Analog or event marker pen presusre should be checked if the ink trace is excessively wide (bleeding), indicating low pen pressure or if pen gouges the chart paper, indicating excessive pen pressure.

NOTE: Wide trace may also indicate an improperly lapped pen. Refer to Paragraph 6.5 for pen lapping procedures.

The gram gage (part number 240601-910) is used to measure the pressure of the analog and event marker pens as follows:

1. Raise pen access cover by pulling out on bottom and sliding back into recorder.

2. Turn ON recorder and set chart SPEED at 5 mm/sec.

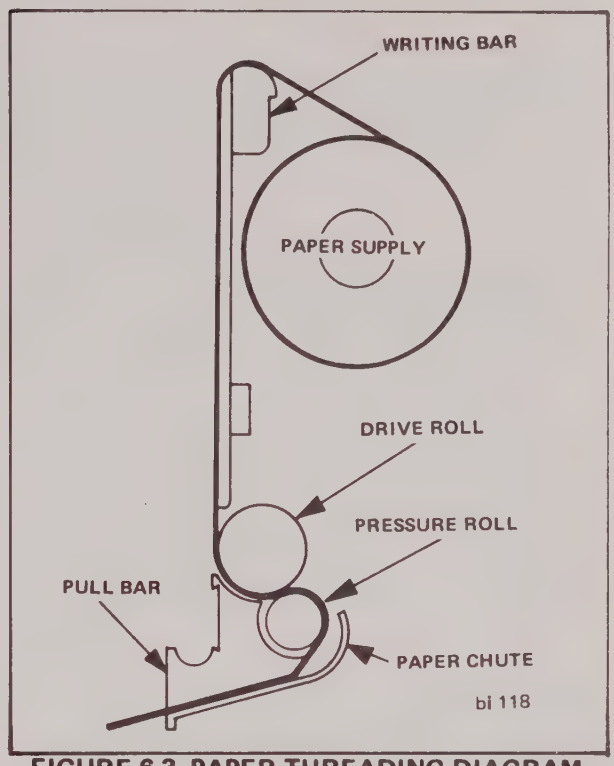


FIGURE 6-3 PAPER THREADING DIAGRAM

3. Place gram gage hook under pen as close as possible to top. Form a right angle to pen shaft with hook (Figure 6-4).

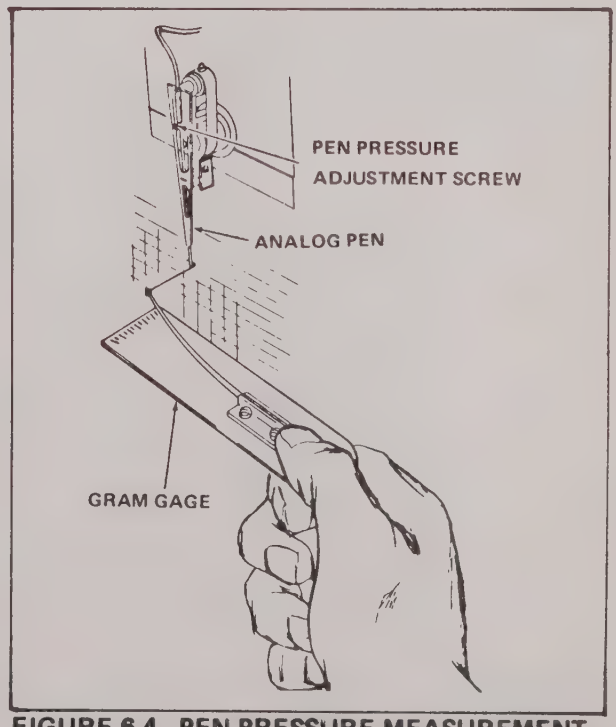


FIGURE 6-4 PEN PRESSURE MEASUREMENT

4. Pull pen from chart as shown in Figure 6-4 and take reading on gage the moment excessive ink starts to flow from pen.

5. Proper pressure for analog pens is 30 ±2 grams, for event marker pen 25 ±2 grams

6. If pen pressure is not within specified limits, adjust pressure using special pen adjustment wrench (Gould part number 1-120922-18). Refer to Figure 6-5. Turn screw clockwise to increase pressure, counterclockwise to decrease pressure.

7. Recheck pen pressure per steps 3, 4 and 5.

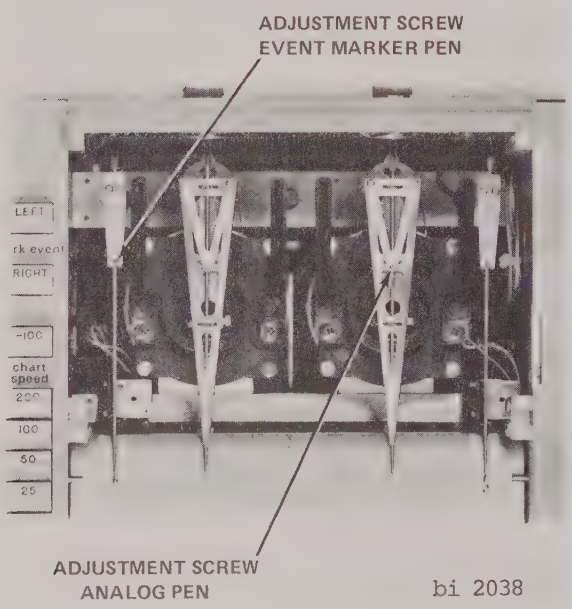


FIGURE 6-5 PEN PRESSURE ADJUSTMENT

6.5 PEN LAPPING

a. General

This paragraph describes and illustrates the proper procedures for lapping the analog and event pens. Intermittent or "wet" ink trace are indications that pen pressure is incorrect or that pen requires lapping. Check for "wet" writing by operating the recorder (no signal applied). Check pen trace by wiping index finger, with moderate pressure, across trace approximately one inch below pen tip. If ink does not smear, pen is properly lapped. If trace smears, check and adjust pen pressure (Para. 6.4). Repeat test, and if trace continues to smear, lapping is required.

b. Lapping Procedures

CAUTION: LAPPING SHOULD ONLY BE DONE WHEN ABSOLUTELY NECESSARY. EXCESSIVE LAPPING WILL SHORTEN PEN LIFE.

1. Turn OFF recorder.

2. Raise pen access cover by pulling out on bottom and sliding it back into recorder.

3. Carefully raise pen tip just enough to slide a small strip of lapping paper (Gould P/N 669234, Silicon Carbide, M-600 grit) under pen tip.

4. Refer to Figure 6-6. Hold lapping paper flat against writing table and move it in a circular motion several times while gently pressing pen tip with finger.

5. Remove lapping paper and clean debris from pen tip. Operate recorder at 5 mm/sec chart SPEED.

6. Check pen trace by wiping index finger, with moderate pressure, across trace about one inch below pen tip. If ink does not smear, pen is properly lapped. If ink smears, check pen pressure per paragraph 6.4.

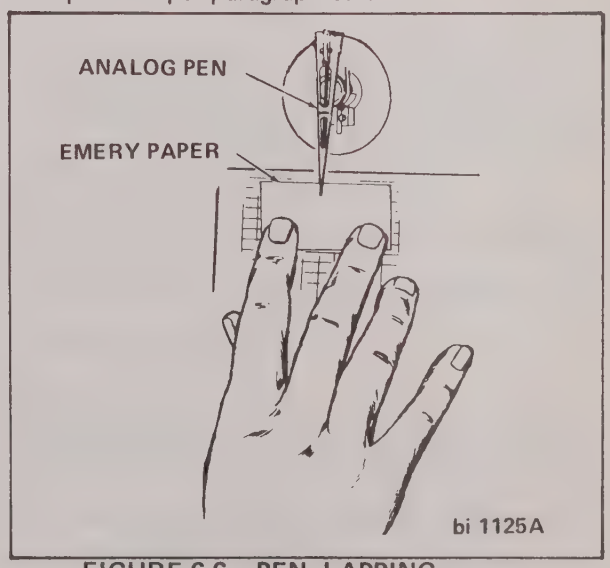


FIGURE 6-6 PEN LAPPING

7. Repeat lapping procedure if necessary.

8. If pen tip should become blocked during lapping operation, touch pen at top of pen (above tip) with a hot soldering iron for a few seconds with the pen tip raised slightly off the paper. This will usually start ink flowing and flush out abrasive.

9. When dry trace is achieved, turn recorder off.

6.6 PEN REPLACEMENT

Pens should only be replaced when excessively worn or broken. Replacement should be performed only by personnel who are familiar with the recorder. Replace and adjust one pen at a time.

CAUTION: POWER IS TURNED OFF.

a. Analog Pen

NOTE: Analog Pen part number is Model 11-2823-42. Ink tubing is included with pen.

1. Remove top front cover from recorder. (Slide cover forward and lift out.) This gains access to individual manual valves.

2. Slide ink valve of pen to be changed to "OFF" position. Follow direction of arrows on manifold bar.

CAUTION: DO NOT PERMIT INK TO SPILL ON RECORDER COMPONENTS. PLACE PAPER TOWELS AROUND AREA.

3. Carefully remove ink tube from manifold valve nipple. Wipe excess ink from nipple.

4. Raise pen access cover by pulling out on bottom and sliding back into recorder. Cover will be parallel with top of recorder.

5. Raise front of cover with one hand and carefully remove ink tube from pen with other hand. Discard ink tube.

6. Loosen two screws (do not remove) which secure pen to drive arm and carefully slide pen off in downward motion. (Figure 6-7).

NOTE: If pen does not readily slide off, it may be necessary to loosen pen pressure adjustment screw also.

7. Carefully slide new pen onto drive arm. Snug the two screws to secure pen. (Pen should be perpendicular to writing surface.)

8. Install new ink tubing between valve nipple and pen.

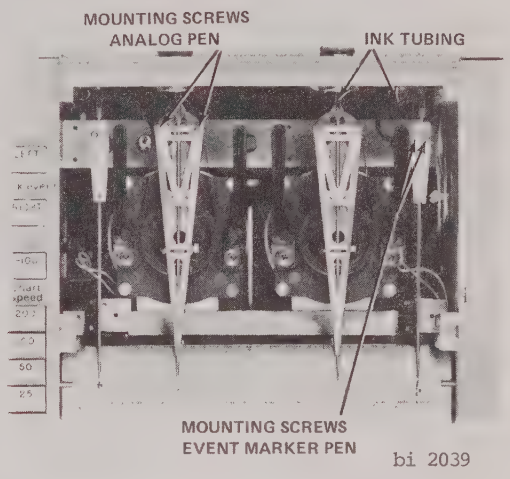


FIGURE 6-7 PEN REPLACEMENT

9. Slide ink valve to "ON" position. Follow direction of arrows on manifold bar.

10. Turn recorder ON and run at a chart speed of 5mm/sec.

11. Carefully lift pen slightly and allow ink to bleed through pen tip.

12. Shut down recorder.

13. Gently grasp pen near top and move it across entire channel. If trace is not parallel to a horizontal line and/or pen is not on same line as other pens, turn pen in screw slots and slide pen vertically. Tighten screws.

14. Lap pen per paragraph 6.5 if necessary.

15. Measure pen pressure per paragraph 6.4.

b. Event Marker Pen

NOTES:

1. **Use steps 1 thru 5 from paragraph 6.6a, Analog Pen, for changing Event Marker Pen.**

2. **Event marker Pen number is 267884-5; ink tubing P/N is 667447-1.**

1. Loosen two screws (do not remove) which secure pen to bracket assembly and carefully slide pen off in downward motion (Figure 6-7).

NOTE: If pen does not readily slide off, it may be necessary to loosen pen pressure adjustment screw also.

2. Carefully slide new pen between pen pressure bracket and bracket assembly. Snug the two screws to secure pen. (Pen should be perpendicular to writing surface.)

3. Install new ink tubing between valve nipple and pen.

4. Slide ink valve to "ON" position.

5. Turn recorder ON and run at a chart speed of 5 mm/sec. Adjust pen ZERO to set pen on event gridline.

6. Carefully lift pen slightly and allow ink to bleed through pen tip.

7. Shut down recorder.

8. If pen tip is not on same line as other pens, loosen screws and slide pen vertically. Tighten screws.

9. Lap pen per paragraph 6.5 if necessary.

10. Measure pen pressure per paragraph 6.4.

6.7 PEN CLEANING

Intermittent, missing, or faint traces may be indications of a clogged pen. The following cleaning procedure is intended as a guide, but may not always prove effective. Access to individual manual valves is required.

1. Turn recorder OFF.

2. Slide ink valve of pen to be cleaned to "OFF" position. Follow arrows.

3. Remove ink tubing from manifold valve nipple.

4. Remove pen (Para. 6.6a or 6.6b).

5. Modify No. 18 hypodermic needle per Figure 6-8.

6. Attach modified needle onto 2cc hypodermic syringe.

7. With syringe plunger depressed, insert needle in pen tubing.

8. Immerse pen tip in cleaning agent (Isopropyl Alcohol, Cell-O-Solve or equivalent.)

9. Back-flush by slowly withdrawing syringe plunger.

NOTE: It may be necessary to allow the pen to remain for a brief period in the cleaning agent to dissolve dried ink at pen tip.

10. Install pen (para. 6.6a or 6.6b).

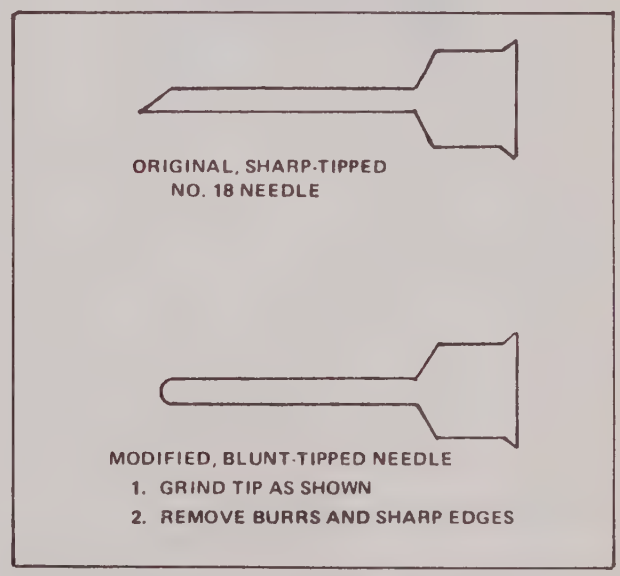


FIGURE 6-8 HYPODERMIC NEEDLE MODIFICATION

6.8 CASE REMOVAL (Portable Models)

When removing the case, be careful not to damage gears or switchboard on recorder assembly.

1. Remove front and rear slide covers from top of recorder case.

2. If recorder is equipped with preamplifiers, remove retainer. (Hardware linking preamp cage with recorder,at top of recorder.)

3. If recorder is equipped with preamplifiers, disconnect preamp cage connector (P203) at top of recorder just behind where retainer was.

4. Remove 5 large machine screws from bottom of case.

5. Slide recorder out from FRONT of case. Push from rear and/or pull from side plates. Do not pull from top front of recorder or chart take-up.

6.9 INK CARTRIDGE REPLACEMENT

Ink supply should be sufficient for one year under normal conditions. Cartridge is located behind left hand plate assembly, and visible thru hole in same plate assembly. See Figure 6-9. Procedure follows:

WARNING: MAKE SURE POWER IS OFF AND RECORDER IS DISCONNECTED FROM POWER SOURCE.

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder a little more than halfway out of rack.)

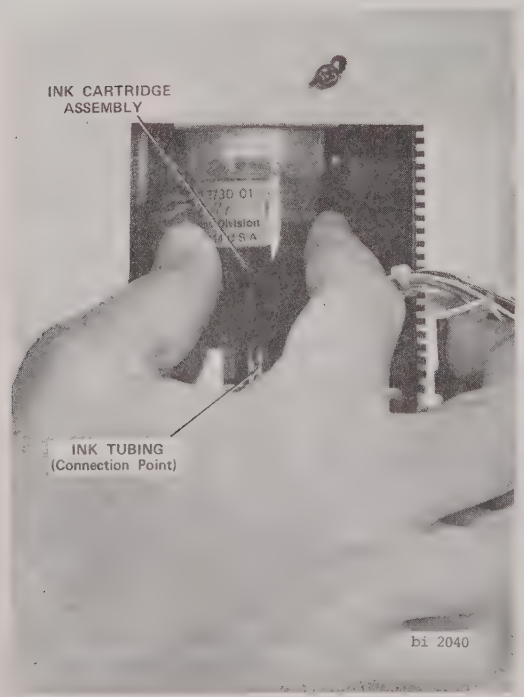


FIGURE 6-9 INK CARTRIDGE REPLACEMENT

2. Observe activating screw, (Figure 6-10). Turn screw clockwise until spring in ink plunger is drawn up tight.

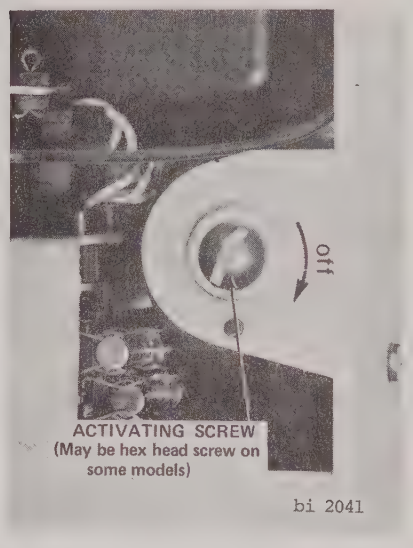


FIGURE 6-10 INK TURN OFF AND TURN ON

CAUTION: DO NOT PERMIT INK TO SPILL ON RECORDER COMPONENTS. PLACE PAPER TOWELS UNDER INK SYSTEM.

3. Carefully pull ink tubing off of ink cartridge.

CAUTION: DO NOT USE TOOLS WHICH MAY GOUGE OR CUT THE INK TUBING.

4. Unscrew ink cartridge from plunger assembly and discard. (Figure 6-9).

5. Remove piston retainer from replacement cartridge and discard. (Figure 6-11)

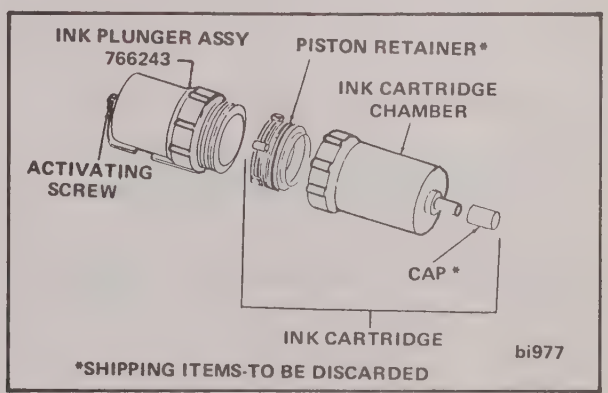


FIGURE 6-11 INK CARTRIDGE ASSEMBLY

6. Install cartridge in plunger assembly and tighten firmly. (Figure 6-9).

7. Remove shipping cap from ink cartridge and discard.

8. Install ink tube on ink cartridge.

9. Turn activating screw counterclockwise (Figure 6-10) until snug to pressurize ink system. Check for leaks.

10. It may be desirous to bleed the inking system at this point. Refer to paragraph 6.12 for procedure.

11. Install recorder in case or slide recorder into rack and secure.

6.10 SOLENOID VALVE ASSEMBLY REPLACEMENT

NOTE: Refer to illustrated parts breakdown of recorder assembly in Section VIII.

WARNING: MAKE SURE POWER IS TURNED OFF AND RECORDER IS DISCONNECTED FROM POWER SOURCE.

Replace solenoid valve assembly (item 9) as follows:

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder completely out of rack.)

2. Turn OFF ink cartridge. (Activating Screw, Figure 6-10.)

NOTE: If solenoid only is to be replaced, turning ink off is not required.

3. Remove Drive Amp board(s) and/or panel filler (for 1 channel recorders) from rear of recorder.

4. In cavity left by Drive Amp boards remove and retain 2 screws and washers in area of Drive Amp board connectors. Solenoid Valve Assembly will fall away from opposite side of bracket wall.

5. Place paper towels around area underneath solenoid valve assembly.

6. If entire assembly is to be replaced perform the following:

   a. Disconnect yellow and orange leads from solenoid terminals. Tag leads.

   b. Pull ink tubing from both valve nipples.

   c. Make connections to new solenoid valve assembly in reverse order of "a" and "b" above. Attach assembly to bracket wall.

   d. It may be desirous to bleed the inking system at this point. Refer to paragraph 6.12 for procedure.

7. If solenoid and diode only are to be replaced perform the following:

   a. Disconnect yellow and orange leads from solenoid terminals. Tag leads.

   b. Remove and retain cotter pin connecting solenoid plunger and valve link.

   c. Remove and retain 2 screws and washers from solenoid housing. Solenoid diode assembly will fall away from housing.

   d. Install new solenoid/diode assembly and make connections in reverse order of "a", "b" and "c" above. Attach solenoid valve assembly to bracket wall.

8. Install Drive Amp board(s) and/or panel filler.

9. Install recorder in case (or rack).

6.11 MANIFOLD ASSEMBLY REPLACEMENT

NOTE: Refer to illustrated parts breakdown of recorder assembly in Section VIII.

Replace manifold assembly (item 34) as follows:

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder a little more than halfway out of rack.)

2. Turn OFF ink cartridge and solenoid ink valve.

3. Place paper towels around area underneath manifold assembly.

4. Pull off ink tubing from manifold to pens and manifold to ink cartridge.

5. Remove four machine screws which secure manifold assembly to side plates. Lift out manifold assembly.

6. Install new or repaired manifold assembly.

7. Replace ink tubing to manifold assembly.

8. Turn ON ink cartridge and solenoid ink valve. Check for leaks.

9. Bleed the inking system per paragraph 6.12.

10. Install recorder in case or slide recorder into rack and secure.

6.12 MANIFOLD BLEEDING PROCEDURE

a. General

After changing or replacing the manifold assembly, it is imperative that the inking system is bled before operating the recorder. This is necessary so that any air trapped in the system is removed to guarantee uninterrupted writing. It may be desirous to bleed the system when changing the ink cartridge and solenoid valve assembly also.

b. Bleeding Procedure

1. Use Figure 6-12 as an aid with the procedure that follows.

2. Slide all manual ink valves (6) to OFF position. Follow arrows on manifold bar.

3. Turn ink solenoid valve OFF. Use screwdriver thru hole in left hand plate assy.

4. Disconnect all pen tubing only from manifold valve nipples. Replace with ink outlet caps (PN 249360). All 5 valve nipples on pen side of manifold must be capped.

5. If inking system is not under pressure turn activating screw on ink plunger assembly counterclockwise until ink fills tubing linking ink cartridge with solenoid valve.

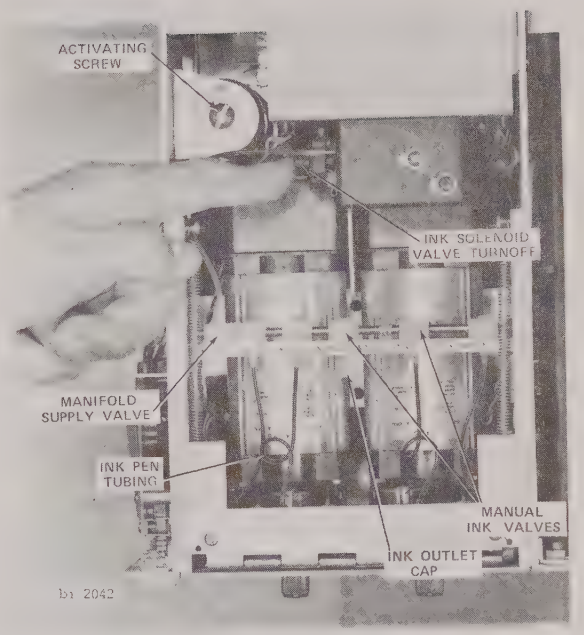


FIGURE 6-12 BLEEDING THE INKING SYSTEM

6. Turn ink solenoid valve ON. Push hinged valve closed with finger. (Figure 6-12.) Solenoid plunger will close, opening diaphragm in valve assembly. Hold closed. Ink should fill tubing linking solenoid valve with manifold supply valve.

7. Open manifold supply valve. Slide to "ON" position. Manifold should fill with ink.

8. Place paper towels under 5 capped manifold valve nipples.

9. Remove cap from valve nipple farthest from manifold supply valve.

10. Allow a few drops of ink to drip from the nipple by sliding the valve directly behind it in the direction of the arrow to "INK ON".

11. Turn the ink off by sliding the valve in the direction of the arrow to "INK OFF". Wipe the nipple free of excess ink and replace the outlet cap.

12. Repeat steps 9 thru 11 for the next closest nipple to the supply valve and so on until all 5 nipples are bled.

13. Replace ink outlet caps with pen tubing where removed in step 4.

6.13 TABLE ASSEMBLY REPLACEMENT

NOTE: Refer to illustrated parts breakdown of Recorder assembly and Writing Table assembly in Section VIII.

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder a little more than halfway out of rack.)

2. Remove paper supply roll per paragraph 6.3.

3. Remove timing belt and pulley assembly from R.H. Plate Assy.

4. Remove retaining rings from table arms and carefully pry arms out of plate assemblies. Do not bend arms.

5. Tilt table slightly and pull out of recorder removing right and left hand lever assemblies.

6. Mount new or repaired table assembly on lever assemblies. Slide table into recorder and snap arms into side plate holes. Replace retaining rings, pulley assy and timing belt.

7. Replace paper supply roll and install recorder in case (or rack).

6.14 DRIVE MOTOR REPLACEMENT

NOTE: Refer to illustrated parts breakdown of Recorder Assembly, Section VIII.

WARNING: MAKE SURE POWER IS TURNED OFF AND RECORDER IS DISCONNECTED FROM POWER SOURCE.

Remove the Motor (B101) as follows:

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder completely out of rack.)

2. Remove rear cover assembly. (Contains AC power cord and TB101.) Move cover away from rear of recorder. (If it becomes necessary to disconnect any leads, make sure they are tagged.

3. Disconnect 2 black leads from motor. Leads terminate at terminals 2 and 5 of TB102.

4. Remove timing belt from small (9 tooth) pulley.

5. Turn recorder on side. Remove 4 motor mounting screws and rubber pads. Remove motor from recorder.

6. Remove and retain 9 tooth pulley (gear) from motor shaft.

7. Install 9-tooth pulley (gear) on shaft of new motor.

8. Install new motor in reverse order of the above procedure.

6.15 TRANSMISSION REPLACEMENT

NOTE: Refer to illustrated parts breakdown of Recorder Assembly, Section VIII.

WARNING: MAKE SURE POWER IS TURNED OFF AND RECORDER IS DISCONNECTED FROM POWER SOURCE.

Remove the Transmission as follows:

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder completely out of rack.)

2. Remove timing belt linking transmission and drive motor. (Access thru square hole in L.H. plate assembly.)

3. Disconnect 5 leads from transmission.

4. Remove timing belt linking transmission and drive roll pulley. (Outside of R.H. plate assembly.)

5. Remove and retain 9 tooth pulley (small gear) from transmission.

6. Remove 3 screws securing transmission to R.H. plate assembly. Remove transmission from recorder assembly.

7. Remove and retain (large gear) pulley from transmission.

8. Install (large gear) pulley on new transmission.

9. Install new transmission in reverse order of the above procedure.

10. Connect leads onto transmission terminals as follows:

TERMINAL	LEAD COLOR
A	Wht/Blk/Grn
B	Wht/Blk/Yel
C	Wht/Blk/Orn
D	Wht/Blk/Red
E	Wht/Blk/Brn

6.16 POWER TRANSFORMER REPLACEMENT

NOTE: Refer to illustrated parts breakdown of chassis assembly in Section VIII.

WARNING: MAKE SURE POWER IS TURNED OFF AND RECORDER IS DISCONNECTED FROM POWER SOURCE.

Replace power transformer(s) (item 64) as follows:

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder a little more than halfway out of rack.)

2. Remove paper supply roll per paragraph 6.3.

3. Remove 2 screws securing transformer to chassis.

4. Note terminal/color code lead connections while disconnecting lugs and before transformer removal.

NOTE: Twelve connections per transformer as follows:

1) Eight lugs on top of transformer.
2) Four leads at bottom of transformer which terminate at TB-103A.

5. Remove defective transformer thru hole in front of recorder.

6. Install new transformer in reverse order of steps 3, 4 & 5.

7. Install paper supply roll.

8. Install recorder in case (or rack).

6.17 PENMOTOR REPLACEMENT

NOTE: Refer to illustrated parts breakdown of recorder assembly and penmotor bar assembly.

WARNING: MAKE SURE POWER IS TURNED OFF AND RECORDER IS DISCONNECTED FROM POWER SOURCE.

Remove penmotor as follows:

1. Remove recorder from case per paragraph 6.8. (If recorder is rack mounted, slide recorder completely out of rack).

2. Remove paper supply roll per paragraph 6.3.

NOTE: To make room for penmotor to be removed from recorder assembly the manifold and valve solenoid assemblies must first be removed. Refer to paragraphs 6.10 and 6.11.

3. Remove pen assembly by loosening 2 screws which secure it to drive arm. Slide pen down and away from penmotor. Refer to Figure 6-7.

4. Remove 2 socket head screws which mount penmotor to penmotor bar. Disconnect connector and remove penmotor from recorder.

5. Install new penmotor in reverse order of procedure above.

6. Install recorder in case (or in rack).

7. Perform calibration on penmotor drive amp after completing installation.

6.18 REPLACING PENMOTOR DRIVE BAND (684999)

CAUTION: IT IS RECOMMENDED THAT THE DRIVE BAND BE REPLACED AT THE FACTORY SO THAT PROPER BAND TENSION IS MAINTAINED. SHOULD FIELD REPLACEMENT BECOME NECESSARY, PERFORM THE FOLLOWING STEPS.

NOTE: Refer to Figure 6-13 for location of parts in capital letters.

a. Band Removal

1. Remove Analog Pen Assembly.
2. Loosen (but do NOT remove) screws securing FRONT and REAR BAND CLAMPS.
3. Remove DRIVE BAND by sliding FREE END in counterclockwise direction from between REAR CLAMP and ANCHOR, then from between FRONT CLAMP and PULLEY.
4. Conclude removal by gently unhooking band from BAND ANCHOR.

b. Band Replacement

1. Place hooked (or bent) end of DRIVE BAND over ANCHOR as shown, and reinstall in clockwise direction between FRONT CLAMP and PULLEY, then between REAR CLAMP and ANCHOR.
2. Apply 5.5 to 6.5 pounds tension to FREE END OF BAND with a spring clamp and spring tension scale or equivalent.

NOTE: Be sure that tension is applied directly in line with band i.e., does not pull band forward or back.

3. Maintaining tension, fully tighten all screws and apply a drop of Red Glyptal or equal at screwheads and mating surfaces.
4. Remove spring scale and spring clamp.
5. Reinstall Analog Pen.
6. Check frequency response for compliance with specifications given in Section I.

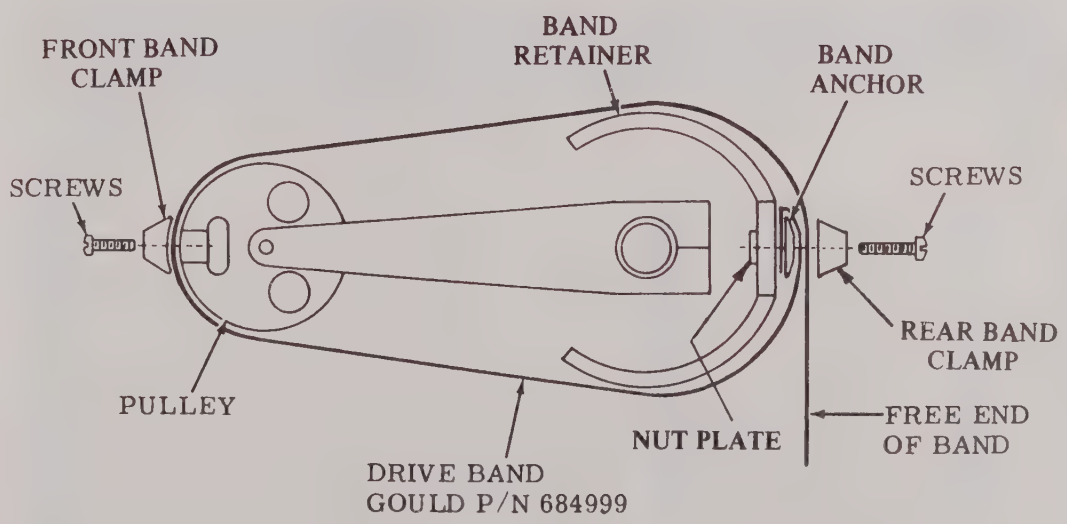


FIGURE 6-13 PENMOTOR DRIVE BAND REPLACEMENT

SECTION VII

CALIBRATION

7.1 GENERAL

The Gould 2200 Series Recorder has been factory calibrated. Under normal conditions, it will not be required. However, calibration may be required when parts are replaced. This section describes the procedures necessary to calibrate the 2200 Series Recorder. Calibration should only be performed by qualified individuals.

7.2 TEST EQUIPMENT REQUIRED

Proper test equipment is essential. Use the equipment specified below or its equal.

a. Function Generator – Wavetek Model 110.

b. DC Calibration Source – Digitec Model 311.

7.3 PRELIMINARY SETUP

a. If the recorder contains preamplifiers, remove each preamplifier from its cage prior to calibrating the channel.

b. Depress recorder STOP button.

c. Plug ac line cord into the proper ac voltage source..

d. Turn ON the recorder.

7.4 CALIBRATION PROCEDURE

Calibration is required on pen drive amplifiers (one per channel) and preamplifiers (if recorder is so equipped). Only pen drive amplifier calibration is discussed in this manual. Refer to the applicable preamplifier manual for its calibration.

Calibration controls and procedures are identical for all channels. Refer to Figure 7-1 and calibrate each pen drive amplifier as follows:

1. Remove the Recorder top rear cover to gain access. Slide cover back and lift out.

2. Connect ac calibration source to phone jack input of drive amplifier. Tip is high, ring is low.

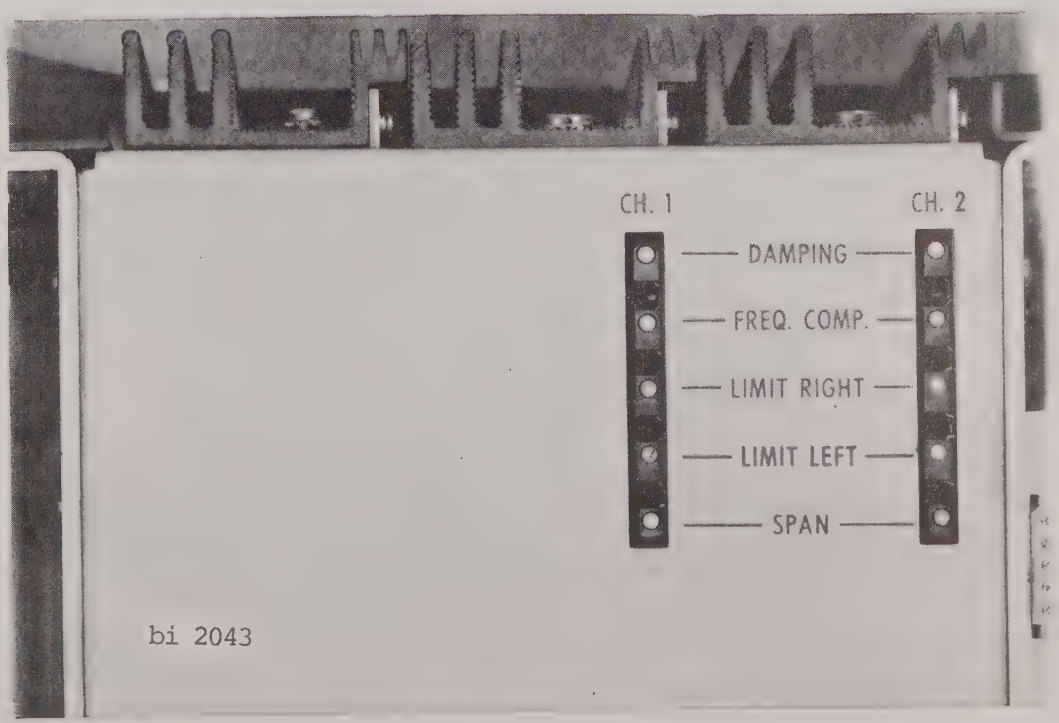


FIGURE 7-1 CALIBRATION CONTROLS

3. Press recorder 5mm/sec CHART SPEED pushbutton.

4. Set dc calibraiton source to ZERO.

5. Set pen at channel center with pen position control.

6. Apply a +2.5 vdc ±0.25 mv signal to drive amplifier and adjust SPAN potentiometer (R260) for full scale deflection withon 0.1%.

7. Return dc calibration source to zero.

8. Turn pen position control full counterclockwise. Pen should deflect left to between 1.0 and 2.0 mm beyond full scale.

9. If deflection is NOT between 1.0 and 2.0mm beyond full scale. adjust LEFT LIMIT potentiometer (R208) for a 1.5 ±0.25 mm deflection beyond full scale.

10. Turn pen position control full clockwise. Pen should deflect right to between 1.0 and 2.0 mm beyond full scale.

11. If deflection is NOT between 1.0 and 2.0mm beyond full scale, adjust RIGHT LIMIT potentiometer (R205) for 1 1.5 ±0.25 mm deflection beyond full scale.

12. Connect function generator.

13. Apply a 4V p-p square wave with a 1.0 Hz repetition rate.

14. Turn DAMPING potentiometer (R231) clockwise until an overshoot is obtained. Then, turn slowly counterclockwise until overshoot is reduced to zero.

15. Check overshoot at 20 and 100 percent pen deflection. No overshoot should be present. Repeat Step 14 if necessary.

16. Increase chart speed to 25 mm/sec.

17. Apply a 5Hz sine wave, and adjust amplitude to obtain a 40 mm pen deflection.

18. Slowly increase frequency to 50Hz. Pen deflection should be within 0.5mm of that at 5Hz.

19. If necessary, adjust FREQUENCY COMP potentiometer (R209) until 50Hz deflection is within 0.5 mm of the 5Hz deflection.

SECTION VIII

PARTS IDENTIFICATION

8.1 GENERAL

This Gould 2200 Series Recorder has been accurately calibrated and adjusted before shipment from the factory, and should give long trouble free service. For servicing beyond the scope of the instructions contained in this manual or the technical equipment available, contact your nearest Gould Service Engineer listed on the warranty card shipped with the recorder.

The following parts lists and schematic diagrams are designed to assist in servicing and repairing the recorder. For replacement parts, refer to the appropriate Figure and Parts List that follow. The items listed do not necessarily imply they are procurable. If an item is marked with an asterisk (*), it is not procurable.

To assure prompt and satisfactory delivery of replacement parts, include the following information with your purchase order:

1. Name and model number of the instrument.
2. Description of part as listed in this manual.
3. Gould part number.

NOTE: Do not use the SYMBOL NUMBER from the parts list for identifying desired parts on the order.

8.2 PARTS USED ON OTHER MODELS

The USED ON column identifies the recorder on which the part is used. If on code is not present, part is common to all models. Below are the codes and explanations:

CODE	EXPLANATION
130-1	130 mm chassis, 1 channel
130-2	130 mm chassis, 2 channel
130-XP	130 mm chassis,(X) channel with preamps.

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER—All Portable Models
FIGURE 8-1

ITEM NO	PART NUMBER	DESCRIPTION	USED ON
	2007-21XX-XX	2200 Recorder, 1 Channel	
	2007-22XX-XX	2200 Recorder, 2 Channel	
1	2007-2190-XX	Recorder Assy, 1 Channel (see Fig. 8-3)	130-1
	2007-2290-XX	Recorder Assy,2 Channel (see Fig. 8-3)	130-2
2	887336	Case Assy w/o preamps (see Fig. 8-15)	
	887334	Case Assy w/preamps (see Fig 8-15)	130-XP
3	287387	Retainer	130-XP
4	888321	Cage Assy, preamp (See Fig. 8-16)	130-XP
5	887005	Panel Assy	130-XP
6	11-6402-13	Chart Take-up (see Fig. 8-17)	

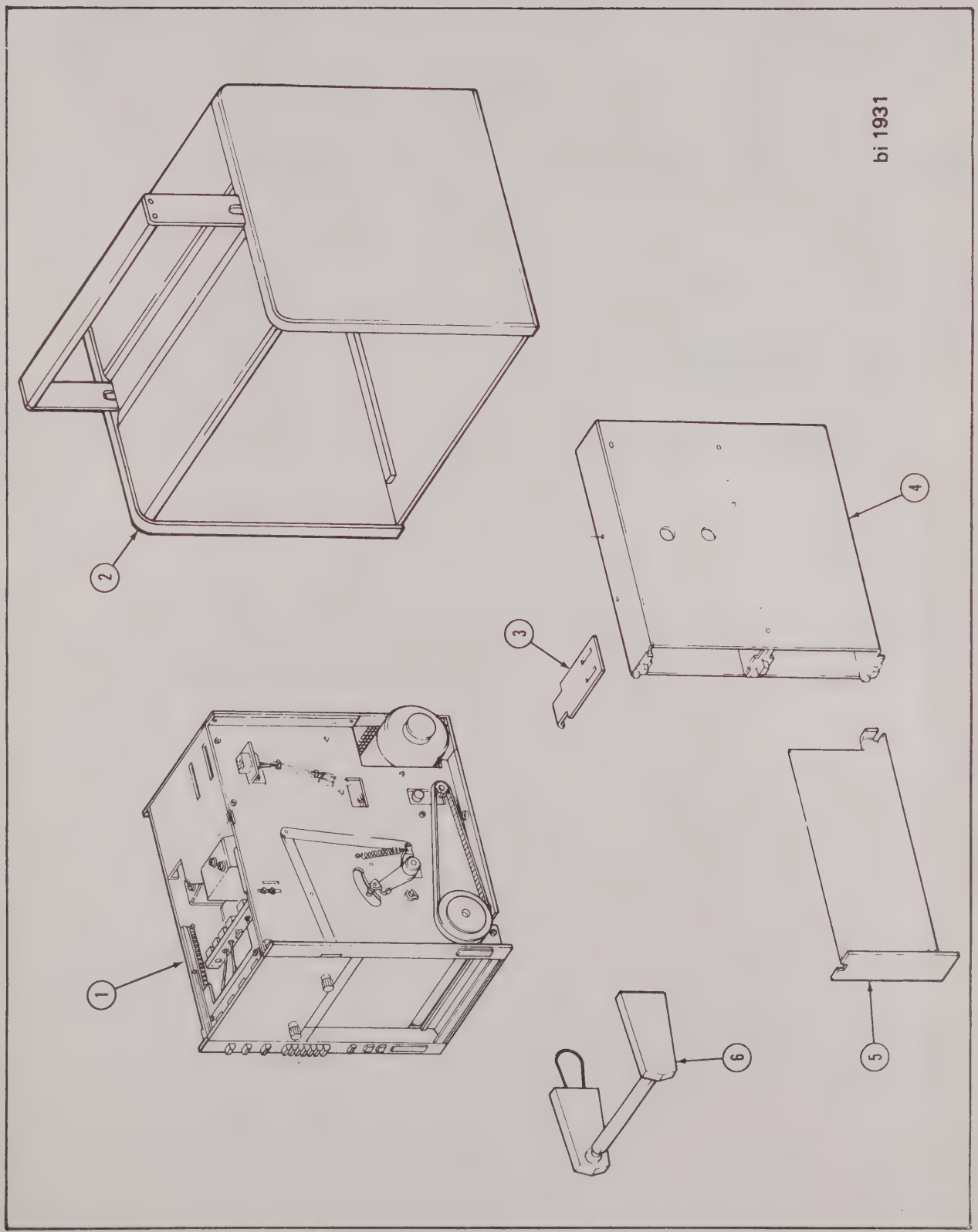


FIGURE 8-1 2200 SERIES RECORDER, PORTABLE

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER – RACK MOUNTED MODELS
FIGURE 8-2

ITEM NO	PART NUMBER	DESCRIPTION	USED ON
	2007-21XX-XX	2200 Recorder, 1 Channel	
	2007-22XX-XX	2200 Recorder, 2 Channel	
1	2007-2190-XX	Recorder Assy, 1 Chan. (See Fig. 8-3)	130-1
	2007-2290-XX	Recorder Assy, 2 Chan. (See Fig. 8-3)	130-2
2	467037	Frame, Shipping	
3	11-1154-61	Cabinet Assembly	
4	887005	Panel Assembly	
5	888321	Cage Assy, preamp (See Fig. 8-16)	130-2P
6	11-6402-13	Chart Take-up Assy (See Fig. 8-17)	
Not Shown	**688007	Kit Assy, Model 11-1202-17 (See Fig. 8-18) (Rack Mount Installation Instructions, Recorder Only)	
Not Shown	**688008	Kit Assy, Model 11-1202-16 (See Fig. 8-19) (Rack Mount Installation Instructions, Recorder and Preamp Cage)	

**Use Kit Model number for ordering purposes.

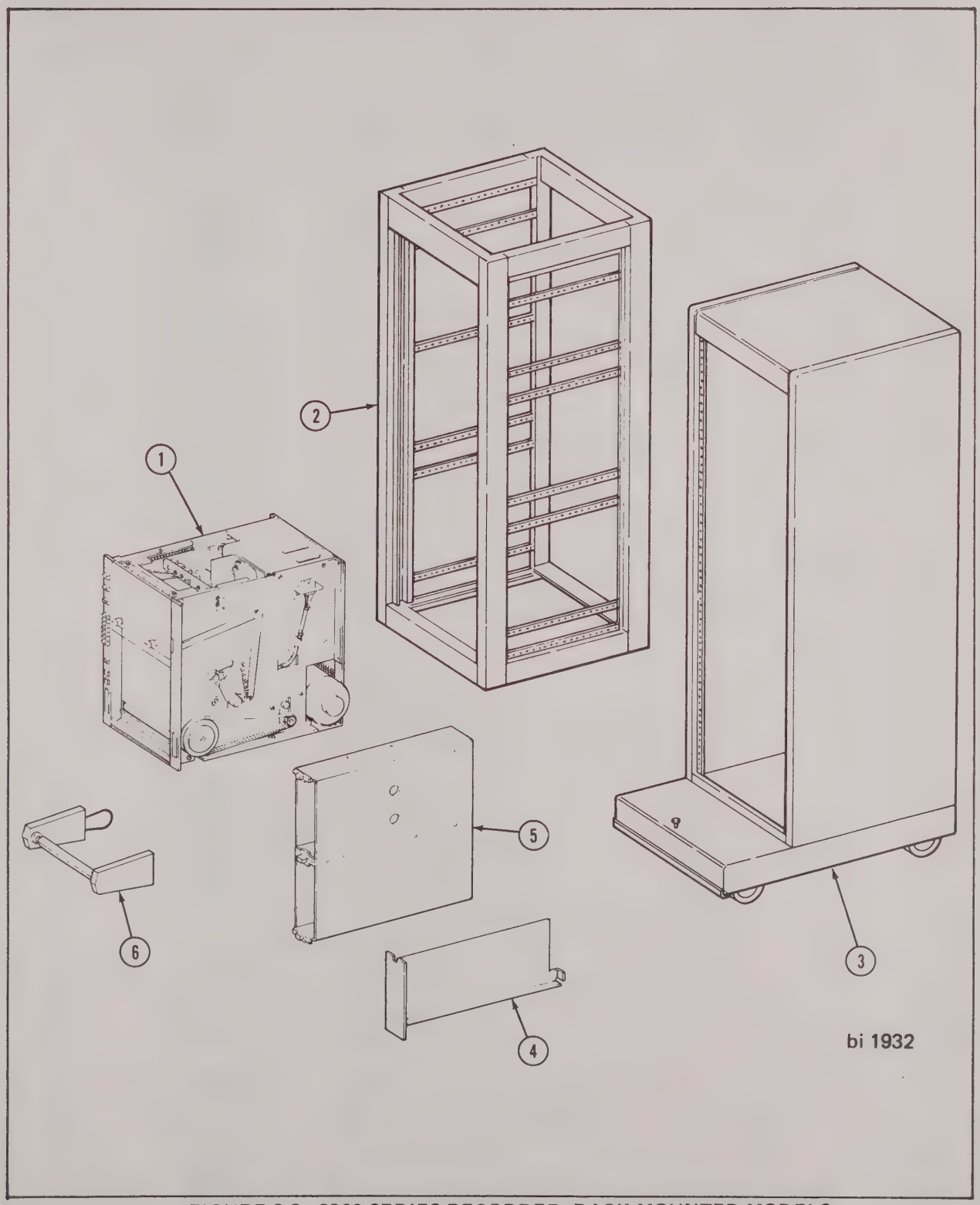


FIGURE 8-2 2200 SERIES RECORDER, RACK MOUNTED MODELS

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER – ALL MODELS
RECORDER ASSEMBLY – 130 mm CHASSIS – 2007-2X90-XX
FIGURE 8-3

ITEM NUMBER	PART NUMBER	DESCRIPTION	SYMBOL NUMBER	USED ON
1	886772	Board Assy, Switch ÷ 100 (see Fig. 8-4)	A-110	
	886772-1	Board Assy, Switch ÷ 60 (see Fig. 8-4)	A-110	
2	286767	Insulator		
3	242461-45	Nut		
4	248169-2	Spacer		
5	885098-2	Plate Assy., L.H. (see Figure 8-5)		
6	287595	Cover, Rear		
7	887593	Connector Assy, 2 Ch. (see Fig. 8-6)		130-2
	887593-1	Connector Assy 1 Ch. (see Fig. 8-6)		130-1
8	666582-2	Ink Tube (Valve Assembly to Manifold)		
9	887425	Valve Assy, Solenoid 115V		
	887425-1	Valve Assy, Solenoid 230V		
9A	1-282285-3	Solenoid 115V (Not Shown)	L-105	
	1-282285-4	Solenoid 230V (Not Shown)	L-105	
9B	269256-7	Diode, 1N4007 (Not Shown)	CR-111	
9C	684169-1	Valve Assy (Not Shown)		
10	786978	Bracket Assy, Top		
11	886327	Board Assy, Control (see Figure 8-7)	A-109	
12	886220	Board Assy, Dr. Amp (see Fig. 8-8)	A-101;A-102	
13	116198-X	Fuse (115V Models) } See Table 8-1, Fuse Table		
	266924-X	Fuse (230V Models) } Following Fig. 8-3 Parts List		
14	114816-15	Plug	P-201	
15	289046	Plug	P-202	
16	287597	Panel, Filler (1 Ch. only)		130-1
17	786975	Bracket Assy, Bottom		
18	265814-6	Terminal Board	TB-102	
19	241026-2	Terminal Lug		
20	265840-2	Terminal Lug		
21	241513-206	Capacitor (115V Models)	C-108	
	231449-27	Capacitor (230V Models)	C-108	
22	265840-1	Terminal Lug		
23	286024	Transformer, Control	T-109	
24	285711	Spring		
25	243225-4	Clamp		
26	286971	Slide		
27	786977-1	Door Assy (2 Ch.)		130-2
	786977-2	Door Assy (1 Ch.)		130-1
28	285651-3	Knob		
29	667447-1	Ink Tube (Event Marker Pens)		
30	887181	Event Marker Assy (see Fig.8-9)		
31	11-2823-42	Pen Assy		
31A	687477-1	Ink Tube (Analog Pen Not Shown)		
*32	787394	Bar Assy, Penmotor 2 Ch. (see Fig. 8-10)		
	787392	Bar Assy, Penmotor 1 Ch. (see Fig. 8-10)		

*Item 32 is not procurable. Order desired parts from Figure 8-10 itemized parts list.

EXPLODED VIEW PARTS LIST (Continued)
2200 SERIES RECORDER – ALL MODELS
RECORDER ASSEMBLY – 130 mm CHASSIS – 2007-2X90-XX
FIGURE 8-3

ITEM NUMBER	PART NUMBER	DESCRIPTION	SYMBOL NUMBER	USED ON
33	289238	Shield		
34	787391	Manifold		
35	1-280875-9	Spacer, Threaded		
36	265814-9	Board, Term.	TB-103A	
37	686973	Shield Assy		
38	1-286155-12	Board, Term.	TB-101	
39	1-280875-8	Spacer, Threaded		
40	129699	Jumper		
41	289225-1	Shield		
42	681257-1	Cable	P-101	
43	108572-12	Strain, Relief		
44	787641	Cover Assy, Rear		
45	287599	Cover, Rear		
46	643785-10	Pulley Assy., Trans.		
47	12-2158-16	Transmission Assy ÷ 100, 60 Hz	A-111	
	12-2160-16	Transmission Assy ÷ 60, 60 Hz	A-111	
	12-2159-16	Transmission Assy ÷ 100, 50 Hz	A-111	
	12-2161-16	Transmission Assy ÷ 60, 50 Hz	A-111	
48	686429	Indicator Assy		
49	243457	Spring		
50	1-227070-3	Ring, Ret.		
51	683485	Brake Assy (see Fig. 8-11)		
52	286531	Spring		
53	263526	Pulley, 12T		
54	243542-11	Belt, Timing		
55	270903-11	Clamp		
56	783590	Sensor Assy (see Fig. 8-13)		
57	285357-3	Shaft		
58	686966	Roll, Drive		
59	267426-3	Paper Deflector		
60	785701-3	Chute, Paper		
61	885083-1	Plate Assy., R.H. (see Fig. 8-12)		
62	265745-1	Washer, Mylar		
63	265741-1	Bearing, Ball		
64	127271	Washer		
65	123913	Washer, Spacer		
66	243542-12	Belt, Timing		
67	288698-1	Pulley, 9 Tooth		
68	291582	Motor, Gear, AC (115V, 60Hz)	B-101	
	287649	Motor, Gear, AC (115V, 50Hz)	B-101	
	287651	Motor, Gear, AC (230V, 50Hz)	B-101	
69	289049-1	Grommet, Rubber		
70	288710	Bracket		

EXPLODED VIEW PARTS LIST (Continued)
2200 SERIES RECORDER – ALL MODELS
RECORDER ASSEMBLY – 130 mm CHASSIS – 2007-2X90-XX
FIGURE 8-3

ITEM NUMBER	PART NUMBER	DESCRIPTION	SYMBOL NUMBER	USED ON
71	487327	Chassis		
72	286026	Transformer, Power	T-101;T-102	
73	787589	Harness Assy, Transmission		
74	786396	Panel Assy, Ft. R.H.		
75	286770	Cover, Panel		
76	887393	Table Assy, Writing (see Fig. 8-14)		
77	127271	Washer		
78	1-227070-9	Ring, Ret.		
79	785718	Flange Assy, Supply		
80	787467	Shaft Assy, Supply		
81	11-2730-01	Ink Cartridge		
82	685196-2	Lampholder Assy		
83	685196-1	Lampholder Assy		
84	285765-1	Lamp	DS-101;DS-102	
85	285764-4	Lens		
86	285764-1	Lens		
87	786393	Panel Assy, Ft. L.H.		
88	2-240731-10	Ring, Ret.		
89	691288	Jumper Assy (Not Shown. Connects inner surface of Door Assy, item 27, and inner surface of R.H. Plate Assy, item 61.)		

TABLE 8-1 FUSE TABLE (ITEM 13)

FUSE SYMBOL	LINE VOLTAGE & FREQUENCY		
	115V/60HZ	115V/50HZ	230V/50HZ
F101, F102	116198-9 3/4A, 125V	116198-10 1A, 125V	266924-7 1/2A, 250V
F109	116198-6 1/4A, 125V	116198-7 3/8A, 125V	266924-2 1/4A, 250V
F111	116198-4 1/8A, 125V	116198-4 1/8A, 125V	266924-5 1/16A, 250V
F112	116198-12 2A, 125V	116198-12 2A, 125V	266924-6 3/4A, 250V

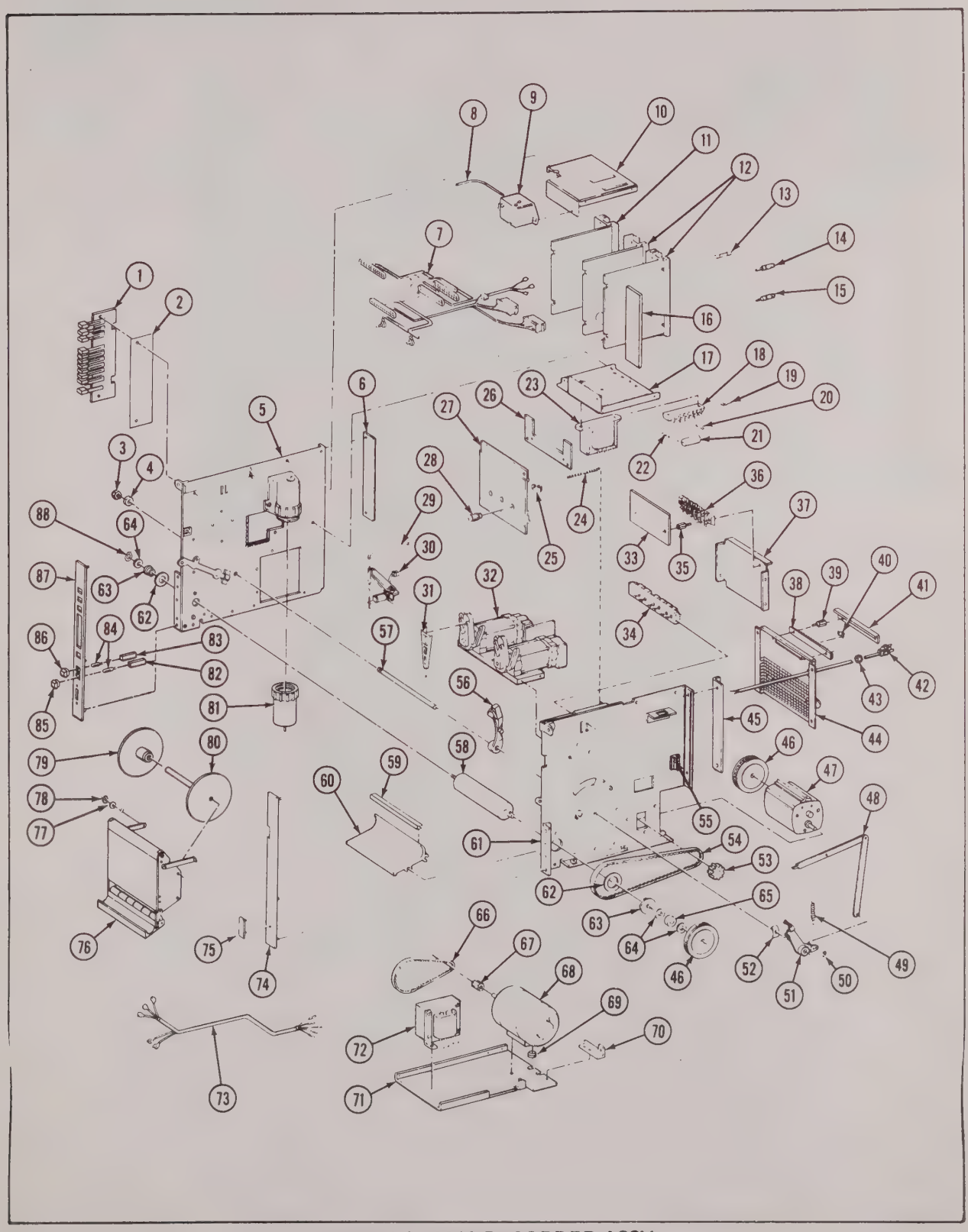


FIGURE 8-3 2200 RECORDER ASSY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER – All Models
BOARD ASSEMBLY, SWITCH
FIGURE 8-4

ITEM NO	PART NUMBER	DESCRIPTION	SYMBOL NO	USED ON
	886772	Board Assy, Switch		÷ 100 Models
	886772-1	Board Assy, Switch		÷ 60 Models
1	385804	Board Printed Circuit		
2	285758	Switch, Speed Select	S-101	
3	786080-1	Button, Switch – "POWER"		
	786080-2	Button, Switch – "STOP"		
	786080-3	Button, Switch – "5"		
	786080-4	Button, Switch – "10"		
	786080-5	Button, Switch – "25"		
	786080-6	Button, Switch – "50"		
	786080-7	Button, Switch – "100"		
	786080-8	Button, Switch – "200"		
	786080-9	Button, Switch – "÷ 100"		÷100 Models
	786080-10	Button, Switch – "LEFT"		
	786080-11	Button, Switch – "RIGHT"		
	786080-12	Button, Switch – "÷ 60"		÷ 60 Models
4	265763-3	Contact		

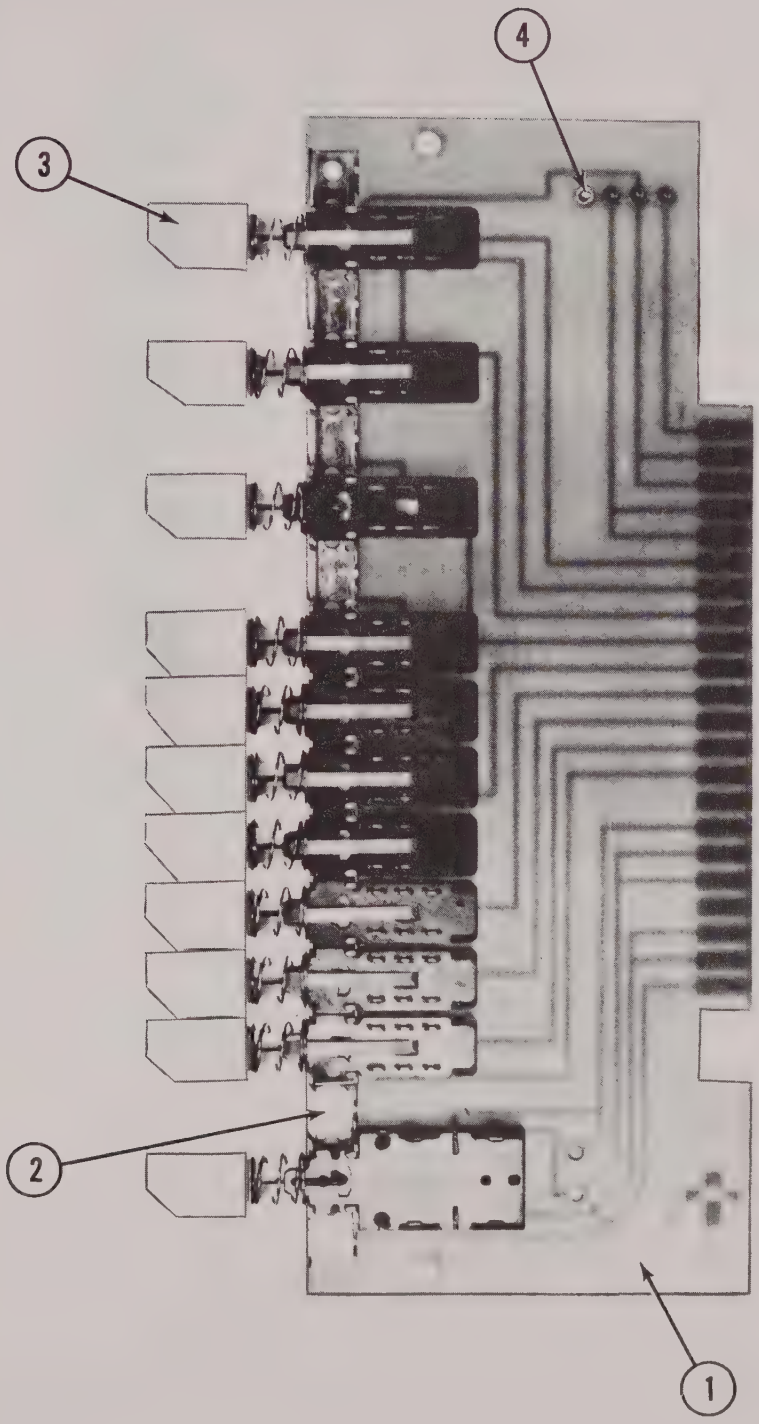


FIGURE 8-4 SWITCHBOARD ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER – All Models
PLATE ASSEMBLY, L.H.
FIGURE 8-5

ITEM NO	PART NUMBER	DESCRIPTION	SYMBOL NO
	885098-2	Plate Assy, L.H.	
1	385619	Bracket, Connector	
2	1-265849-4	Bracket	
**3	885046-1	Plate Subassy	
4	385543-2	Guide	
5	766243	Ink Plunger Assy	
6	2-128693-3	Grommet	
7	243623	Spring	
8	243622	Pad, Friction	
9	243611-910	Lever Assy	
9A	243440	Bumper	
9B	265711	Catch	
10	285929	Bracket, L.H.	
11	285599	Catch	
12	127271	Washer	
13	1-227070-9	Ring, Retaining	
14	286015-1	Filter, RFI	FL-101

**Items 9A and 9B part of item 3.

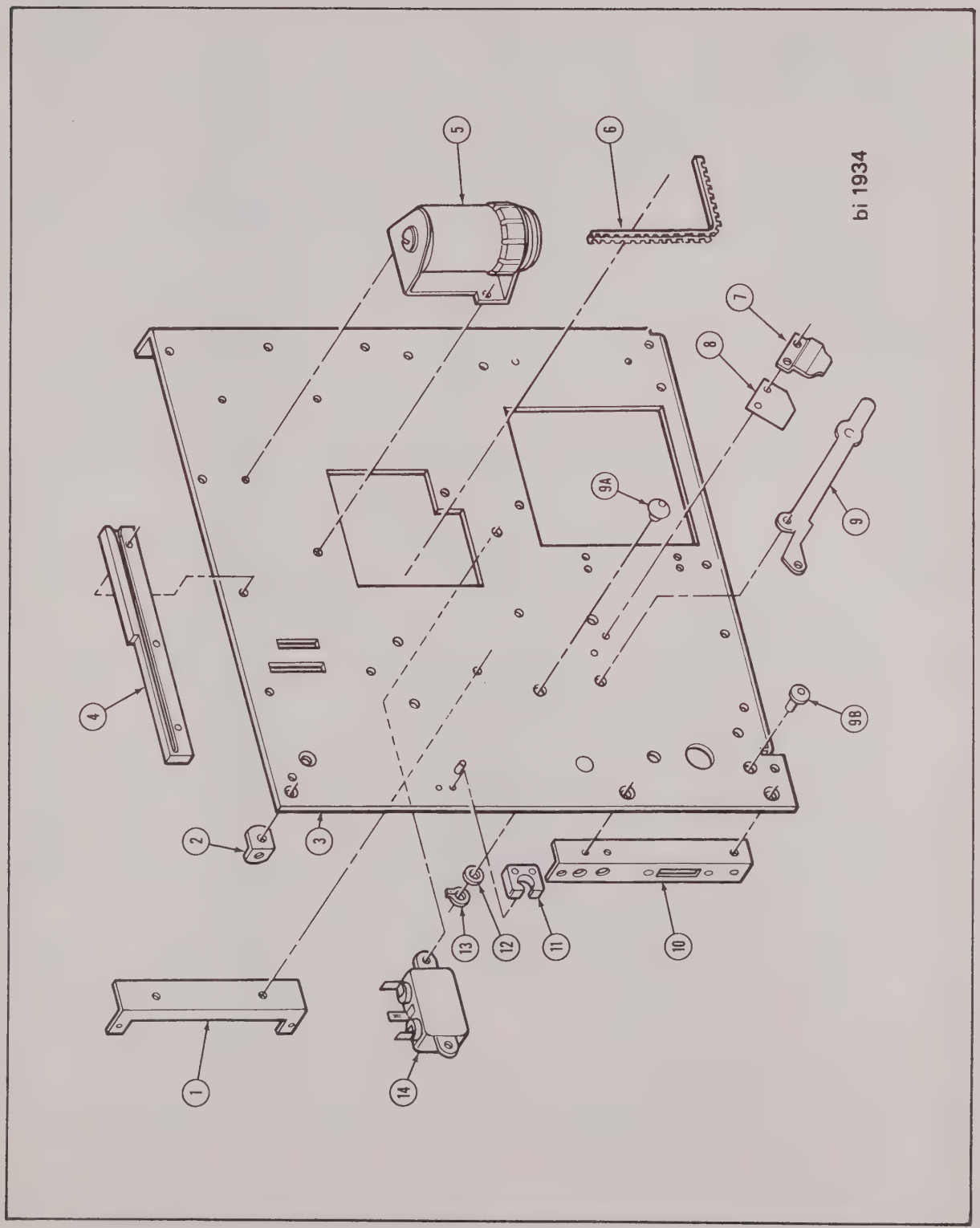


FIGURE 8-5 PLATE ASSY, L.H.

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER—All Models
CONNECTOR ASSEMBLY—130mm MAINFRAME
FIGURE 8-6

ITEM NO	PART NUMBER	DESCRIPTION	SYMBOL NO	USED ON
	887593-1	Connector Assembly, 1 Channel		130-1
	887593	Connector Assembly, 2 Channel		130-2
	785087	Harness Assembly, Penmotor		
1	9-281501-82	Connector	XM-101,XM-102	
2	281506-3	Contact, Elec.		
3	1-283408-2	Contact, Elec.		
	887591	Harness Assembly		
4	283420-44	Connector	XA109,XA110	
5	1-283408-2	Contact, Elec.		
6	265840-1	Lug, Terminal		
7	265915-1	Lug, Terminal		
8	284700	Key, Polarizing		
	785089	Harness Assembly, Power Transformer		
9	1-283408-2	Contact, Elec.		
10	265840-1	Lug, Terminal		
	788091	Harness Assembly, Pen Position		130-1
	787424	Harness Assembly, Pen Position		130-2
11	1-283408-1	Contact, Elec.		
12	10-286044-103	Resistor, Variable	R-101,R-102	
	887399	Harness Assembly		
13	9-270159-2	Connector	P-105 thru P-107	
14	270154-1	Contact, Elec.		
15	1-283408-1	Contact, Elec.		
16	283420-44	Connector	XA-101,XA-102	
17	286598	Spring, Commoning		
18	265840-1	Lug, Terminal		
19	265915-1	Lug, Terminal		
20	286594-1	Lug, Terminal		
21	9-270159-15	Connector	J-103	
22	284700	Key, Polarizing		
23	265840-1	Lug, Terminal		
24	1-283408-2	Contact, Elec.		

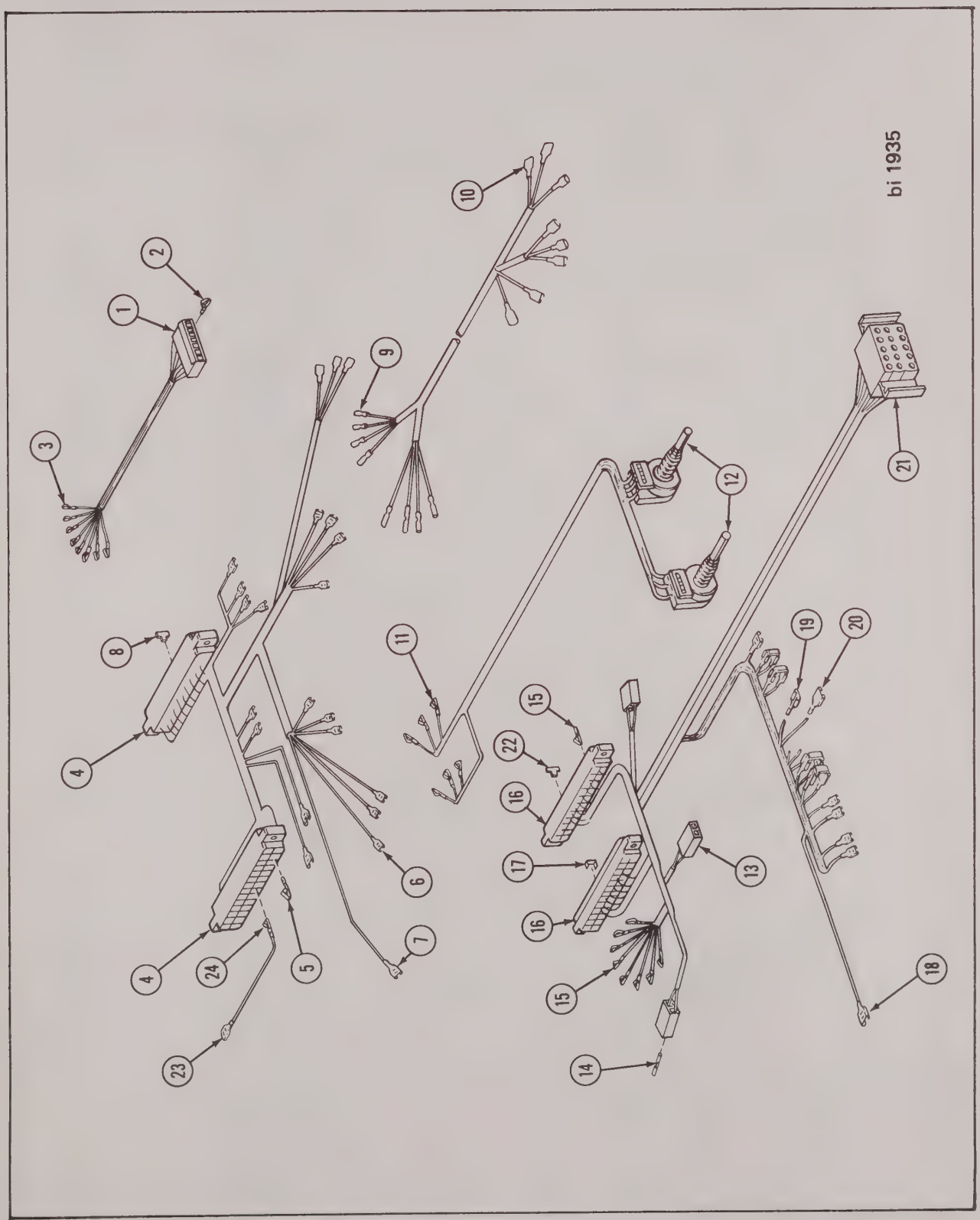


FIGURE 8-6 CONNECTOR ASSEMBLY

2200 SERIES RECORDER – INK WRITING MODELS
CONTROL-TIMER BOARD ASSEMBLY – 886327 (Schematic 292274)
FIGURE 8-7

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
C101, 102	243037-507	Capacitor
C103	262585-106	Capacitor
C104	240352-102	Capacitor
C105	262585-475	Capacitor
C106	230098-104	Capacitor
CR101	286018-2	Diode, MDA104
CR102, 103	286018-1	Diode, MDA101
CR104	Not Used	
CR105, CR106	269256-7	Diode, 1N4007
CR123	280440	Diode, 1N4148
Jumper	267235	Jumper Circuit
K101	289048-24	Relay
Q101, 102, 104	292538-2	Transistor, 2N6427
R101, 102	5-241111-302	Resistor
R103	5-241111-242	Resistor
R104, 105	5-241111-103	Resistor
R106	5-241111-271	Resistor
R107	5-241111-103	Resistor
R108	5-241111-302	Resistor
R109	5-241111-334	Resistor
S103	268923	Switch (A-P)
	285179	Switchplate
	31-119918-4004	Screw
	1-118195-304	Washer, Plain
	1-216741-411	Lockwasher
		------*------
S104	286142-8	Switch
U101	285317	Voltage Regulator, MC7805CP (A-P)
	31-119918-4004	Screw
		------*------
U102 thru U105	270622	Integrated Circuit, 7493
U106	286016	Integrated Circuit, SN74121
U107	285589	Isolator, Led, 4N28
HS	686397	Heatsink (A-P)
	31-119918-4004	Screw
	1-118195-304	Washer, Plain
	1-216741-411	Lockwasher
		------*------
FC	285577	Fuse Clip

NOTE: See Table 8-1, Fuse Table, for fuse ratings.

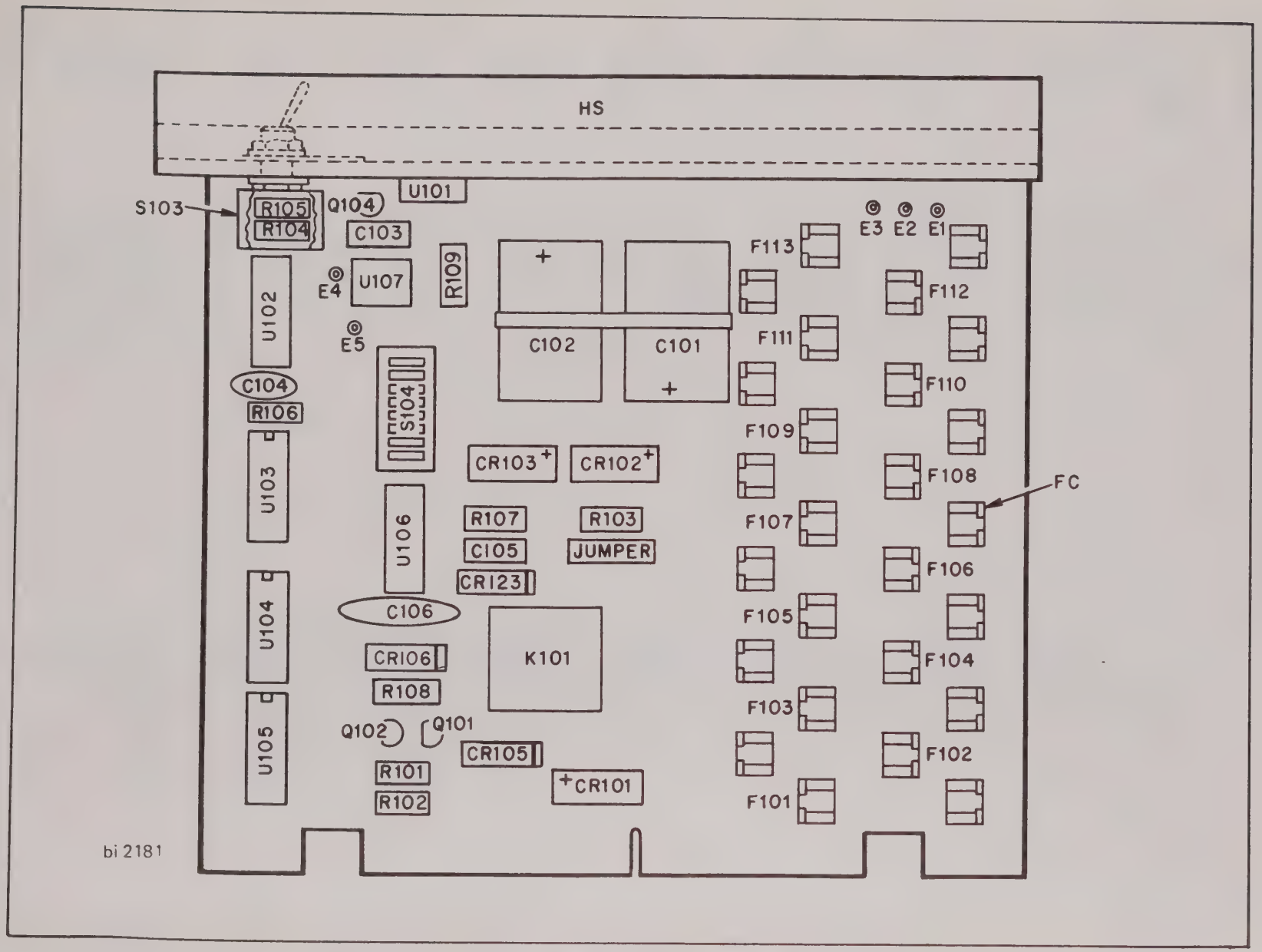


FIGURE 8-7 CONTROL TIMER BOARD ASSEMBLY

BOARD ASSEMBLY, DRIVE AMPLIFIER – 886220 (Schematic 292273)
FIGURE 8-8

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
C201	10-125904-223	Capacitor
C202	10-247116-102	Capacitor
C203, 204	10-247116-102	Capacitor
C205	240352-501	Capacitor
C206	10-247116-103	Capacitor
C207	240352-501	Capacitor
C208	262585-106	Capacitor
C209	10-247116-103	Capacitor
C210, 211	10-247116-102	Capacitor
C212	240352-202	Capacitor
C213	10-125904-503	Capacitor
C214	10-125904-223	Capacitor
C215	281509-507	Capacitor
C216	262585-106	Capacitor
C217	281509-507	Capacitor
C218	262585-106	Capacitor
C219-222	286010-108	Capacitor
*C223	288755-104	Capacitor
CR201, 202	263727	Diode, 1N961B
CR203-208	270508	Diode, 1N4454
CR209, 210	286018-1	Diode, MDA-101
CR211	269256-7	Diode, 1N4007
CR212	270508	Diode, 1N4454
Q201	281703-2	Transistor, 2N4403
Q202	281702-2	Transistor, 2N4401
Q203-205	286141	Transistor, 2N3904
Q206	1-230057-3	Transistor, 2N4923
Q207	1-286145-1	Transistor, 2N5982 (A-P)
	12-119918-4006	Screw
		——————*——————
Q208	1-230058-3	Transistor, 2N4920
Q209	1-286147-1	Transistor, 2N5985 (A-P)
	12-119918-4006	Screw
		——————*——————
Q210	281857-2	Transistor, 2N5033
R201	1-281851-30002	Resistor
R202	1-281851-1002	Resistor
R203	1-281851-43201	Resistor
R204	1-281851-10002	Resistor

* Used only in 80mm applications.

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
R205	282299-103	Resistor
R206, 207	1-281851-69000	Resistor
R208	282299-103	Resistor
R209	282299-202	Resistor
R210	1-281851-200R0	Resistor
R211	1-281851-10002	Resistor
R212, 213	1-281851-10001	Resistor
R214	1-281851-16601	Resistor
R215, 216	1-281851-10000	Resistor
R217, 218	1-281851-80000	Resistor
R219	1-281851-72001	Resistor
R220	1-281851-40000	Resistor
R221	1-281851-80001	Resistor
R222	1-281851-40001	Resistor
R223, 224	5-241111-622	Resistor
R225	5-241111-392	Resistor
R226, 227	1-281851-50001	Resistor
R228	1-281851-10002	Resistor
R229	1-281851-60001	Resistor
R230	1-281851-60000	Resistor
R231	282299-502	Resistor
R232	1-281851-500R0	Resistor
R233	1-281851-10003	Resistor
R234	1-281851-26501	Resistor
R235	5-241111-104	Resistor
R236	5-241111-203	Resistor
R237	5-241111-822	Resistor
R238	5-241111-102	Resistor
R239, 240	5-241111-202	Resistor
R241	5-241111-391	Resistor
R242	5-241111-102	Resistor
R243	5-286587-181	Resistor
R244	5-283654-220	Resistor
R245	5-286587-181	Resistor
R246	5-241111-102	Resistor
R247	1-281851-20001	Resistor
R248	1-281851-500R0	Resistor
R249, 250	1-281851-80000	Resistor
R251	5-241111-104	Resistor
R252, 253	5-241111-103	Resistor

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
R254	1-281851-16001	Resistor
R255	1-281851-50000	Resistor
R256	5-241111-101	Resistor
R257	1-281851-20001	Resistor
R258	Not Used	
R259	1-281851-40001	Resistor
R260	282299-103	Resistor
R261	Not Used	
R262	5-241111-104	Resistor
R263, 264	5-130340-2R0	Resistor
R265	5-241111-822	Resistor
U201-204	280863-3	Integrated Circuit, 741C
U205	269941-2	Integrated Circuit, 1439P1
U206	280863-3	Integrated Circuit, 741C
U207	285461	Voltage Reg., MC 7815
		(A-P)
	12-119918-4005	Screw
		------*------
U208	285778	Voltage Reg., MC 7915
		(A-P)
	12-119918-4005	Screw
		------*------
U209, 210	Not Used	
U211	285589	Isolator, LED, 4N28
HS	686391	Heatsink
		(A-P)
	31-119918-4005	Screw
	1-118195-304	Washer
	1-216741-411	Lockwasher
		------*------
---	685187	Jack Assembly
J201	285315	Jack
J202	289045	Jack
		(A-P)
	1-120052-211	Lockwasher
		------*------
E1 thru E4	265763-3	Contact

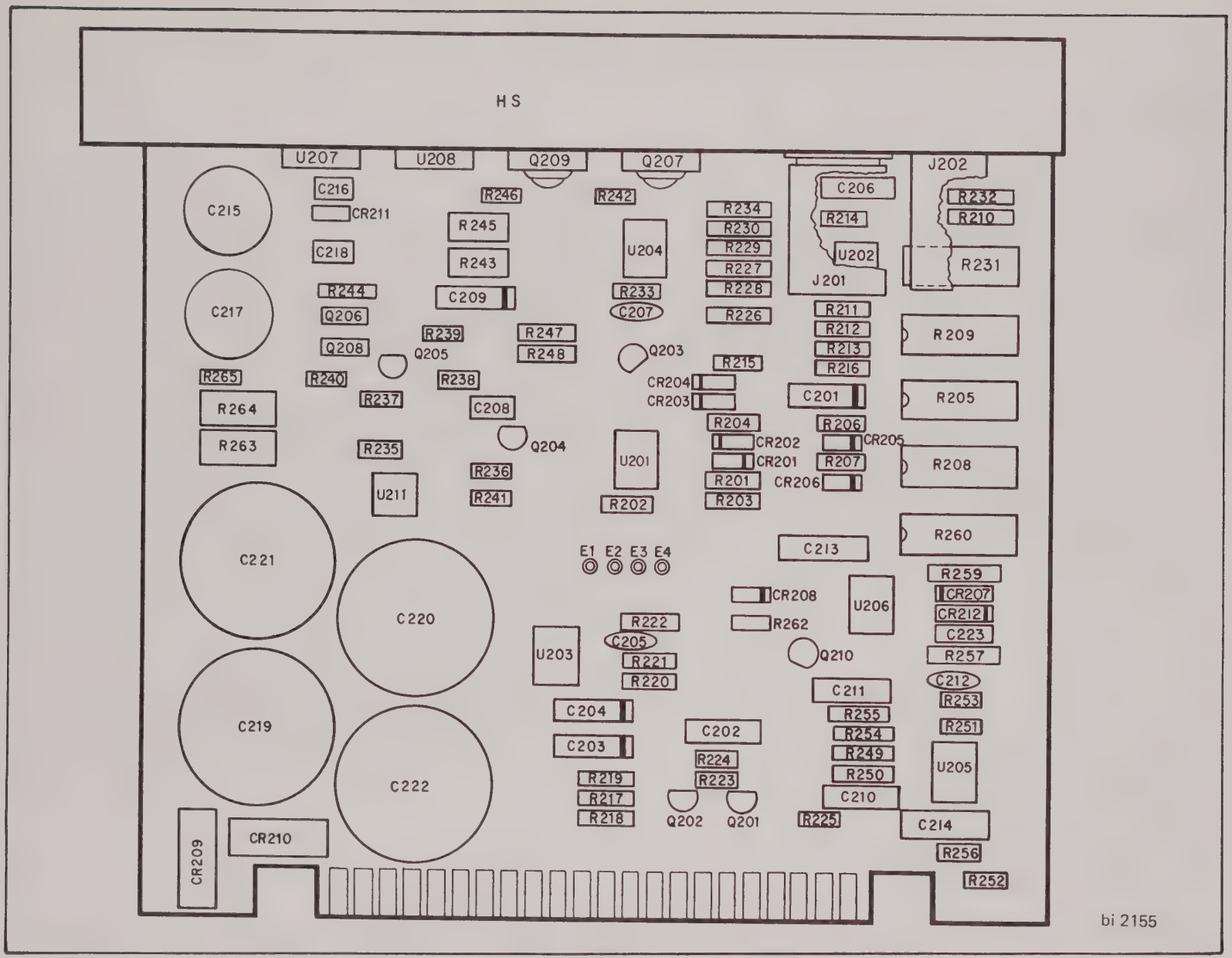


FIGURE 8-8 DRIVE AMPLIFIER BOARD ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER—All Models
INTERCHANNEL EVENT MARKER—887181
FIGURE 8-9

ITEM NO	PART NUMBER	DESCRIPTION	SYMBOL NO	USED ON
	887181	Interchannel Event Marker Assy		
1	286619	Nut, Plate		
2	Not Used			
3	786658	Bracket Assy		
4	270153-1	Contact		
5	9-270158-2	Connector, Plug	J-105 thru J-107	
6	269256-7	Diode	CR-114 thru CR-116	
7	3-227070-2	Ring, Retaining		
8	385930	Pivot, Pen		
9	286416	Spring, Helical		
10	249249-14	Pin		
11	260742-1	Washer, Flat		
12	286415	Solenoid	L-108 thru L-110	
13	267884-5	Tube, Pen		
14	241073-0803	Screw, Set		
15	285166	Bracket, Pen Pressure		

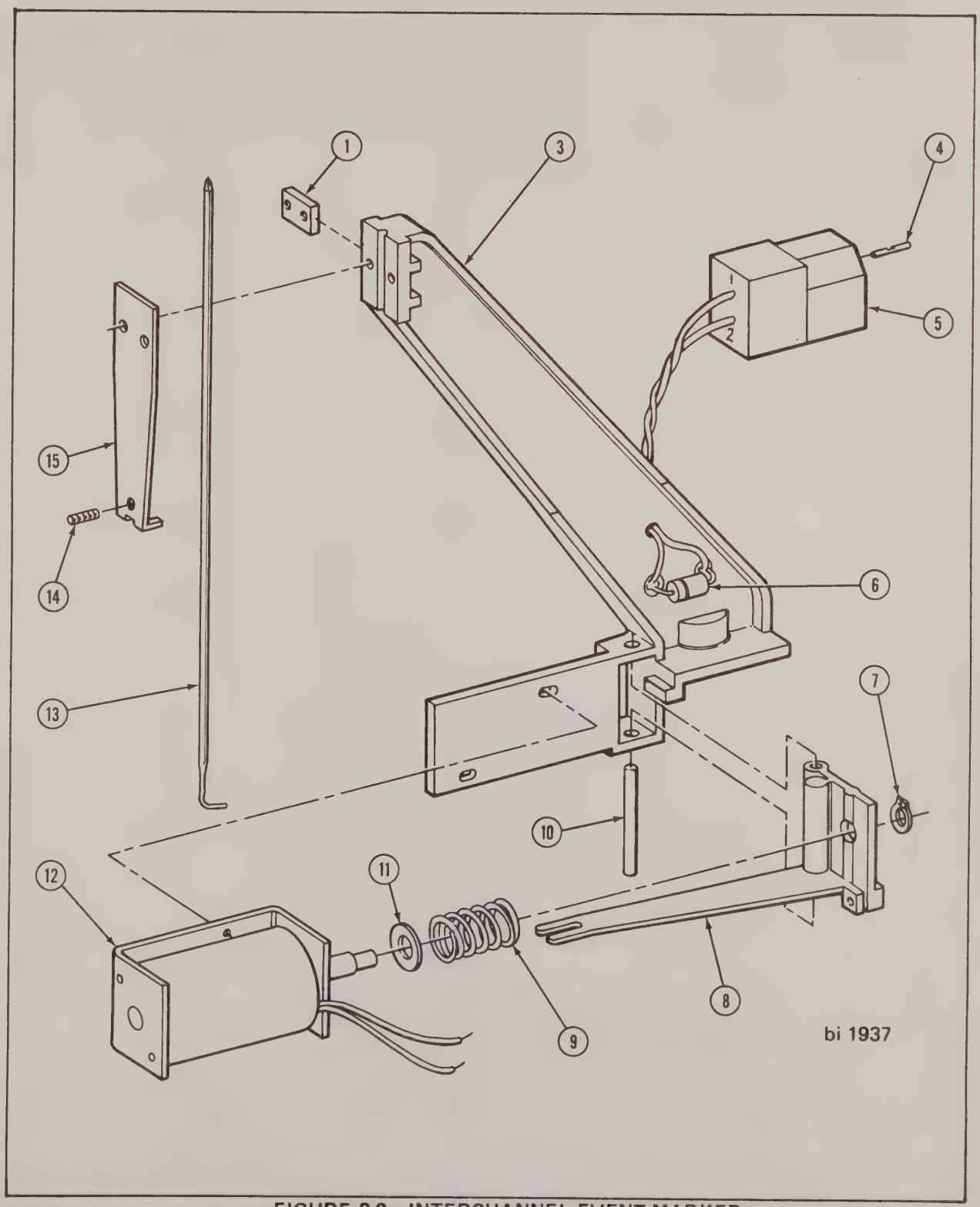


FIGURE 8-9 INTERCHANNEL EVENT MARKER

2200 SERIES RECORDER – Ink Writing Models
PENMOTOR BAR ASSEMBLY – 130mm Mainframe
FIGURE 8-10

ITEM NUMBER	PART NUMBER	DESCRIPTION	SYMBOL NUMBER
	†787392	Bar Assy, Penmotor – 1 Ch	
	†787394	Bar Assy, Penmotor – 2 Ch	
1	884320	Penmotor Assy (A-P)	M-101, M-102
	1-216741-425	Lockwasher	
	31-119922-8210	Screw	
		–––––*–––––	
2	287184	Shield (A-P)	
	13-262716-4004	Screw, Self-Tap	
		–––––*–––––	
3	2-128693-1	Grommet	
4	286972	Bar, Mtg	
5	684853	Saddle, Penmotor	
6	384597	Stop (Part of Item 1) (A-P)	
	31-119918-4008	Screw	
	1-118195-304	Washer	
		–––––*–––––	
7	684896	Band Clamp, Rear (Part of Item 1) (A-P)	
	265424-09010	Screw	
		–––––*–––––	
8	285273	Anchor, Band (Part of Item 1)	
9	684999	Band, Drive (Part of Item 1)	
10	284993	Bracket, Pen (Part of Item 1) (A-P)	
	31-119914-0004	Screw (Front Holes)	
	241073-0803	Screw, Set (Rear Hole Adjustment)	
		–––––*–––––	
11	784583	Drive Arm Assy (Part of Item 1) (A-P)	
	31-119922-2608	Screw	
	31-119998-26	Nut, Hex	
		–––––*–––––	
12	684896	Band Clamp, Front (Part of Item 1) (A-P)	
	265424-09008	Screw	
		–––––*–––––	
13	284924	Plate, Nut (Part of Item 1)	

†Penmotor Bar Assembly not procurable. Use item 1 thru 13 and attaching parts.

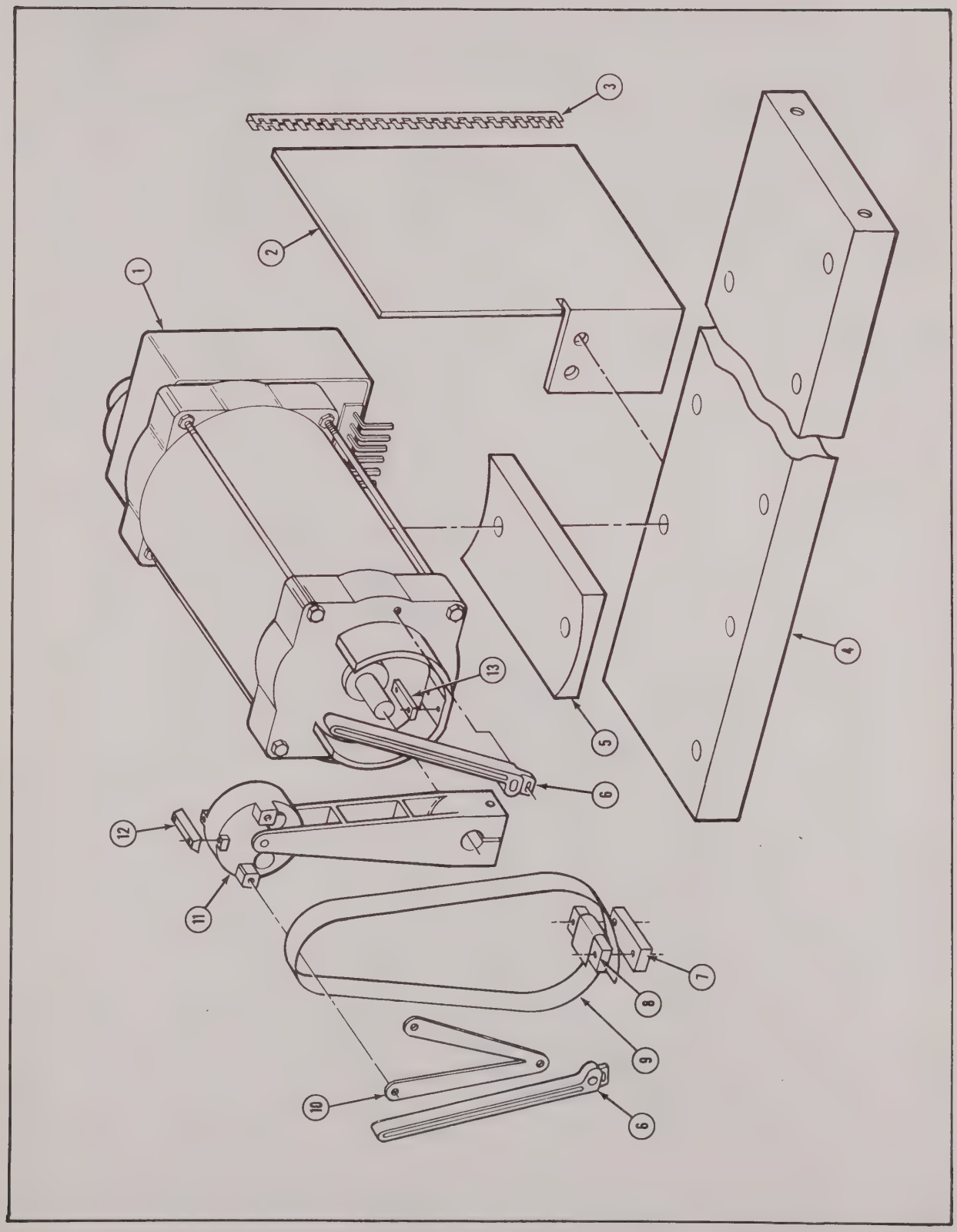


FIGURE 8-10 PENMOTOR BAR ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER– All Models
BRAKE ASSEMBLY 683485
FIGURE 8-11

ITEM NO	PART NUMBER	DESCRIPTION
1	685127	Disk Assy
2	269291	Spring
3	0-108400-15	Insulation, Flex Sleeve
4	743913-10	Arm Subassy
5	0-240731-2	Ring, Retaining

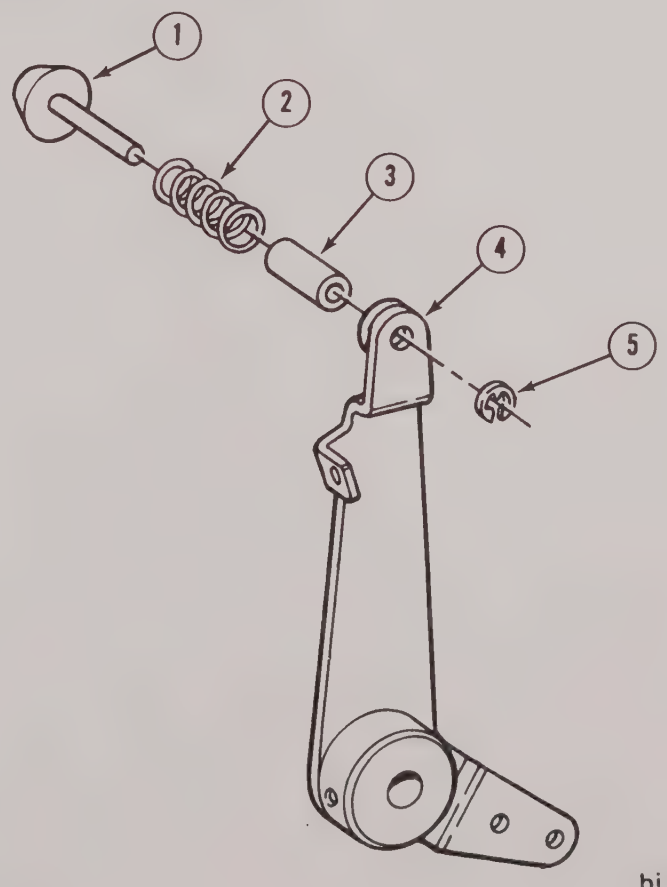


FIGURE 8-11 BRAKE ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER—All Models
PLATE ASSEMBLY, R.H.
FIGURE 8-12

ITEM NO	PART NUMBER	DESCRIPTION
	885083-1	Plate Assy, R.H.
1	385543-1	Guide
2	886560-1	Plate Subassy
3	287389	Bracket, Conn.
4	127271	Washer
5	1-227070-9	Ring, Retaining
6	285712	Bracket, R.H.
7	265711	Catch
8	665789	Lever Assy, R.H.
9	243622	Pad, Friction
10	243623	Spring
11	285599	Catch
12	1-265849-4	Bracket

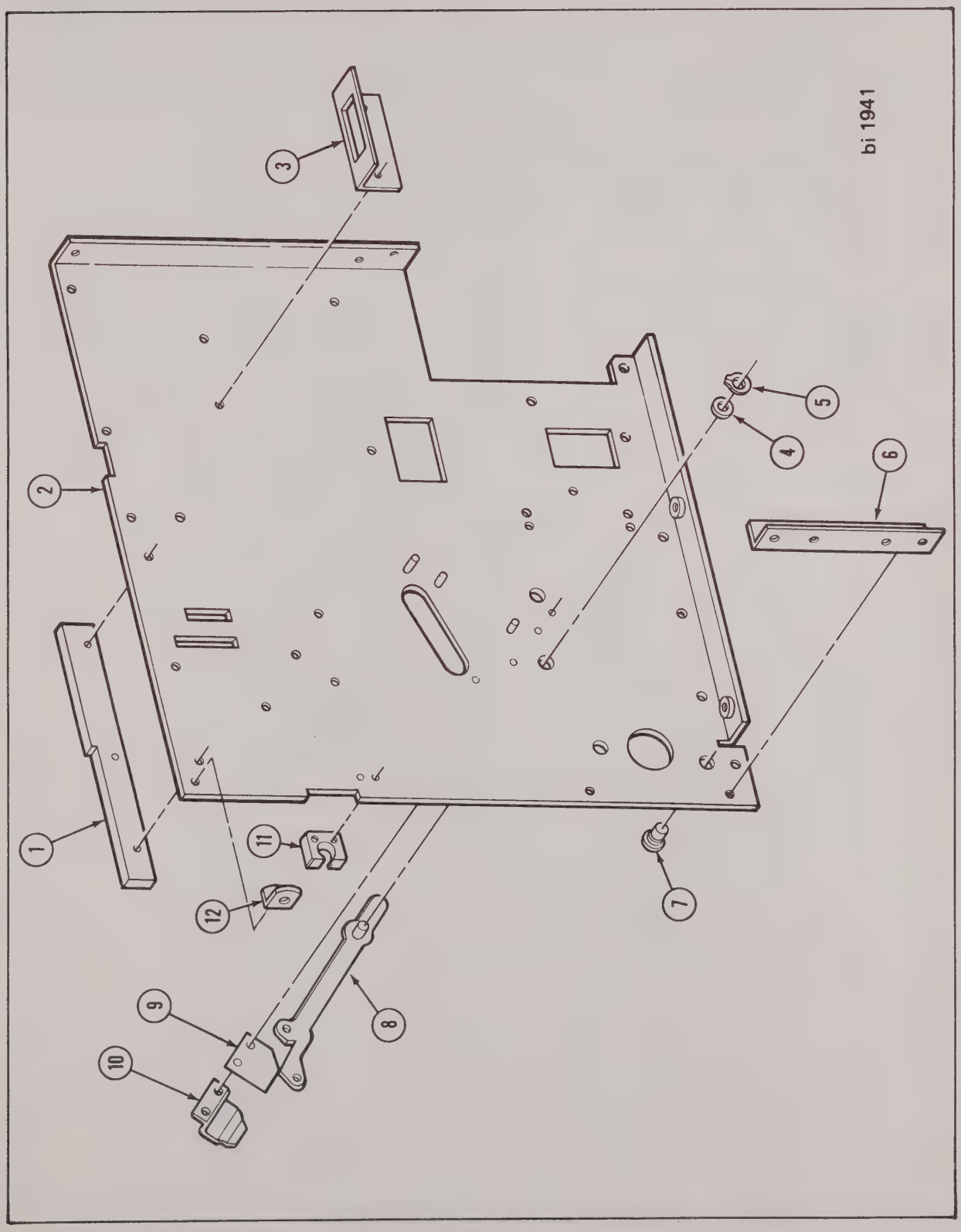


FIGURE 8-12 R. H. PLATE ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER—All Models
SENSOR ASSEMBLY
FIGURE 8-13

ITEM NO	PART NUMBER	DESCRIPTION	SYMBOL NO
	783590	Sensor Assembly	
1	286154	Switch, Sensitive	S-102
2	286386	Arm Switch	
3	743915	Arm Assy, Sensor	
4	286385	Spring, Torsion	
5	286384	Pin	

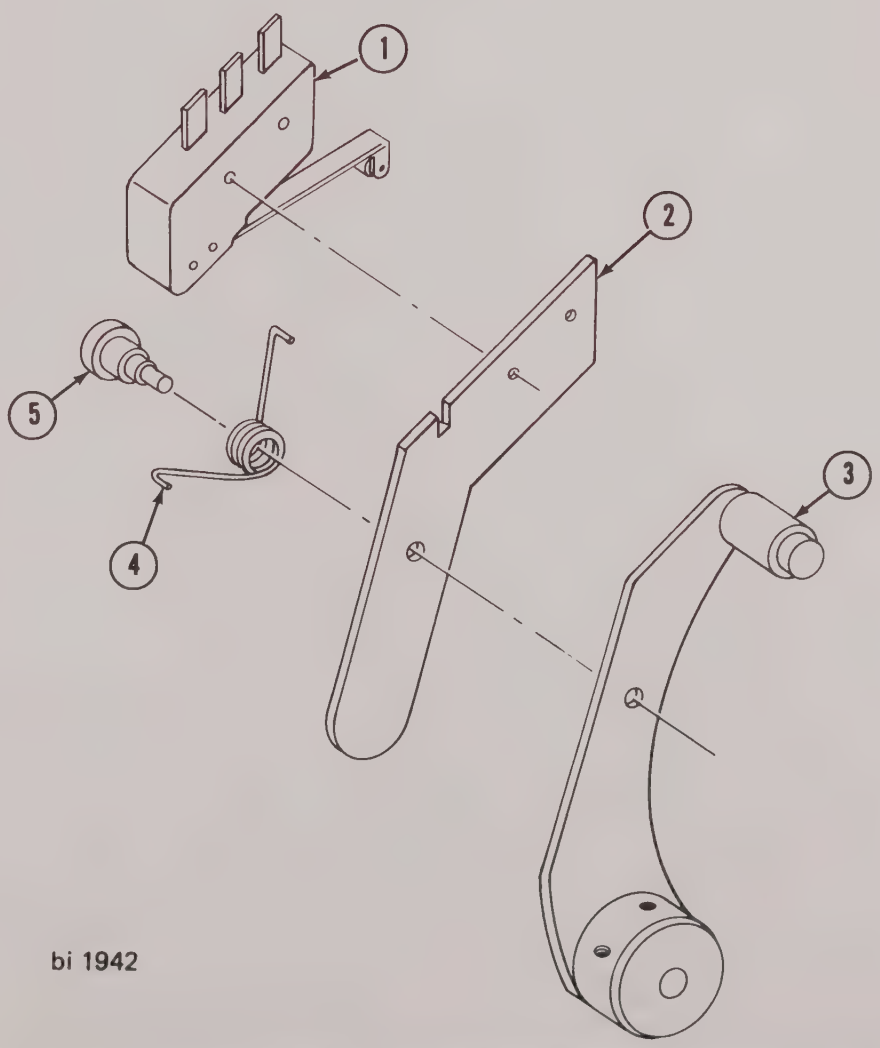


FIGURE 8-13 SENSOR ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER—All Models
TABLE ASSEMBLY, WRITING
FIGURE 8-14

ITEM NO	PART NUMBER	DESCRIPTION
	887393	Table Assy, Writing
1	787396	Bar Assy, Writing
2	687390	Paper Release Assy
3	343616-910	Support Assy, Right
4	4-112468-21	Roll Pin
5	1-210761-6	Bearing, Ball
6	286974	Roll, Pressure
7	685620-1	Bar Assy, Pull
8	243867-1	Packing, Preformed
9	343617-910	Support Assy, Left

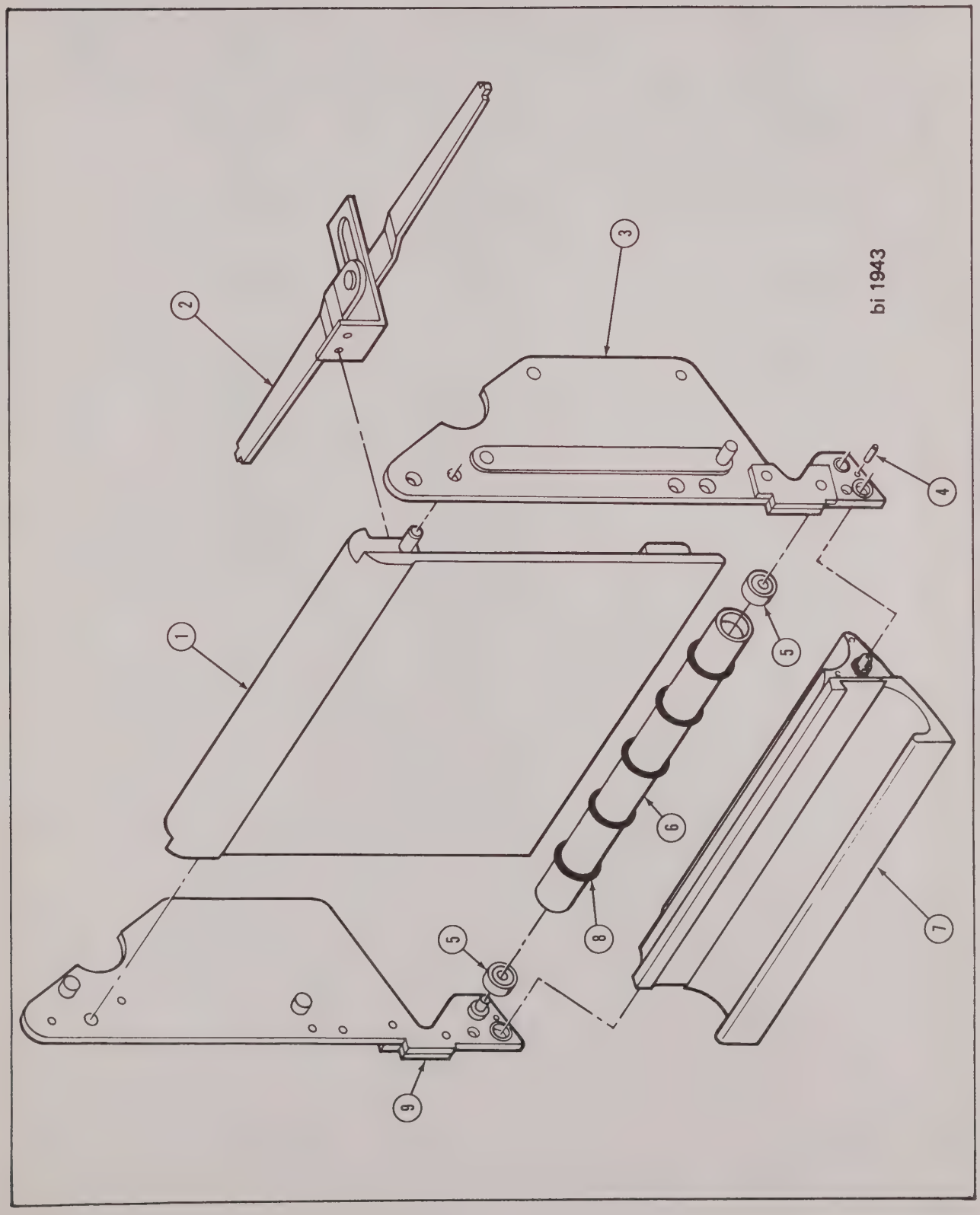


FIGURE 8-14 WRITING TABLE ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER
CASE ASSEMBLY
FIGURE 8-15

ITEM NO	PART NUMBER	DESCRIPTION	USED ON
	887336	Case Assembly	130-1 & 2
	887334	Case Assembly	130-XP
1	486081	Side Panel	
2	785099-7	Handle Assembly	130-1 & 2
	785099-6	Handle Assembly	130-XP
		consisting of:	
	286050	Slide, Handle	
	686074-7	Handle	130-1 & 2
	686074-6	Handle	130-XP
3	686049-7	Cover, Center	130-1 & 2
	686049-6	Cover, Center	130-XP
4	286048	Support, Handle	
5	486075-2	Guide, Left	
6	486075-1	Guide, Right	
7	686051-7	Cover, Front & Rear	130-1 & 2
	686051-6	Cover, Front & Rear	130-XP
8	1-232736-16	Tape, Teflon	
9	3-266107-5	Bail Assembly	
10	487326	Saddle Assembly	130-1 & 2
	887328	Saddle Assembly	130-XP
11	287185	Bar Support	
12	292817-1	Spacer	130-XP

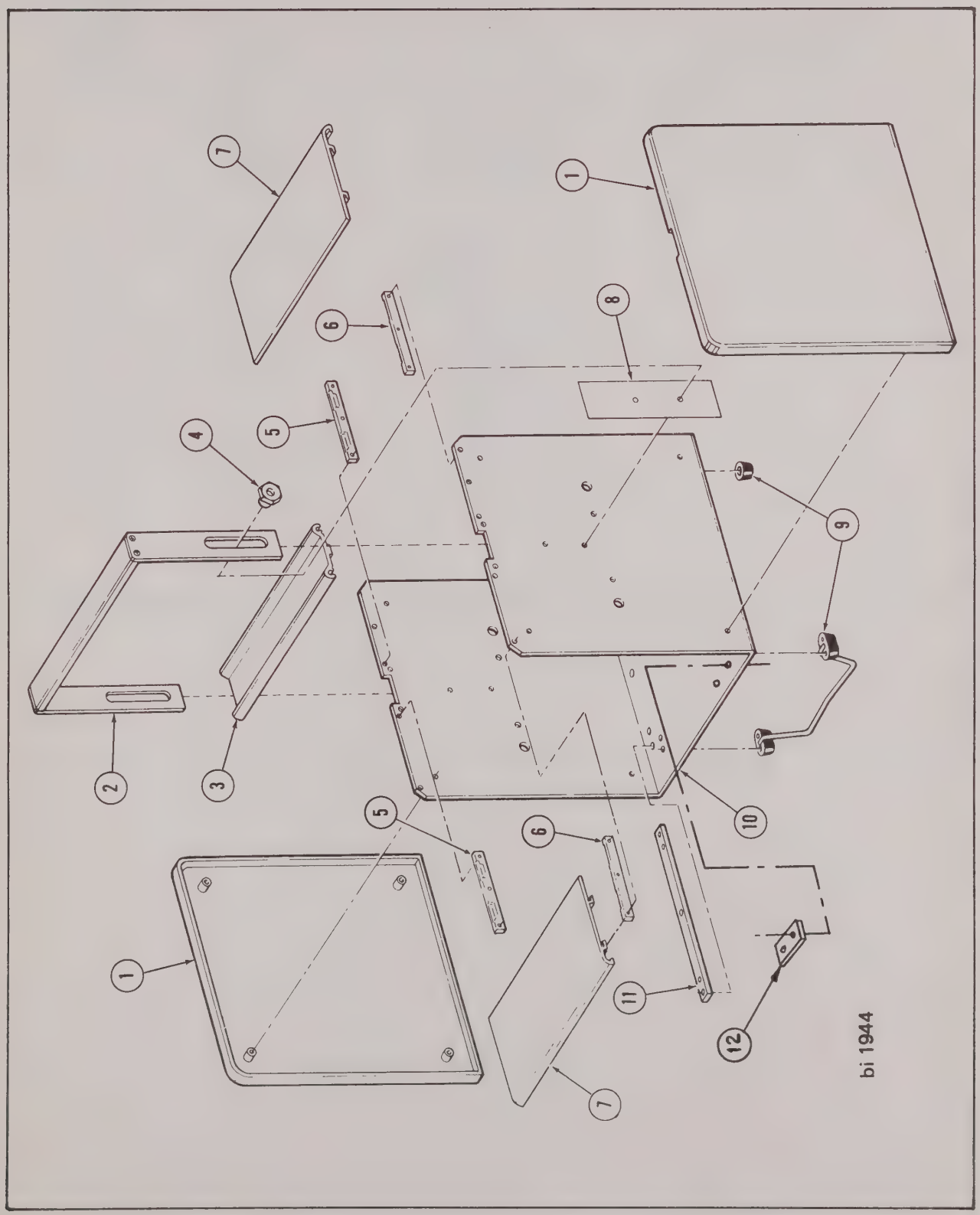


FIGURE 8-15 CASE ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER
CAGE ASSEMBLY PREAMP
FIGURE 8-16

ITEM NO	PART NUMBER	DESCRIPTION	SYMBOL NO
	888321	Cage Assembly, Preamp, 2 Channel	
1	786056-1	Guide, Engraved "1"	
	786056-2	Guide, Engraved "2"	
2	386058-2	Guide, Preamp	
3	386476	Shelf	
4	486461	Enclosure, Preamp	
*5	788280	Cage Assembly, Rear consisting of:	
6	286052	Screw, Shoulder	
7	786475	Panel Assembly, Rear	
8	234623-6	Clamp, Loop	
9	3-240731-10	Ring, Retaining	
10	787422	Harness Assembly consisting of:	
11	286410-16	Connector	XA201,202
12	1-283408-2	Contact (for item 11)	
13	270153-1	Contact (for item 14)	
14	9-270158-15	Connector	P203

*Item 5, Cage Assembly—Rear, not procurable. Use indented items 6 thru 14 or Preamp Cage Assembly at top of list.

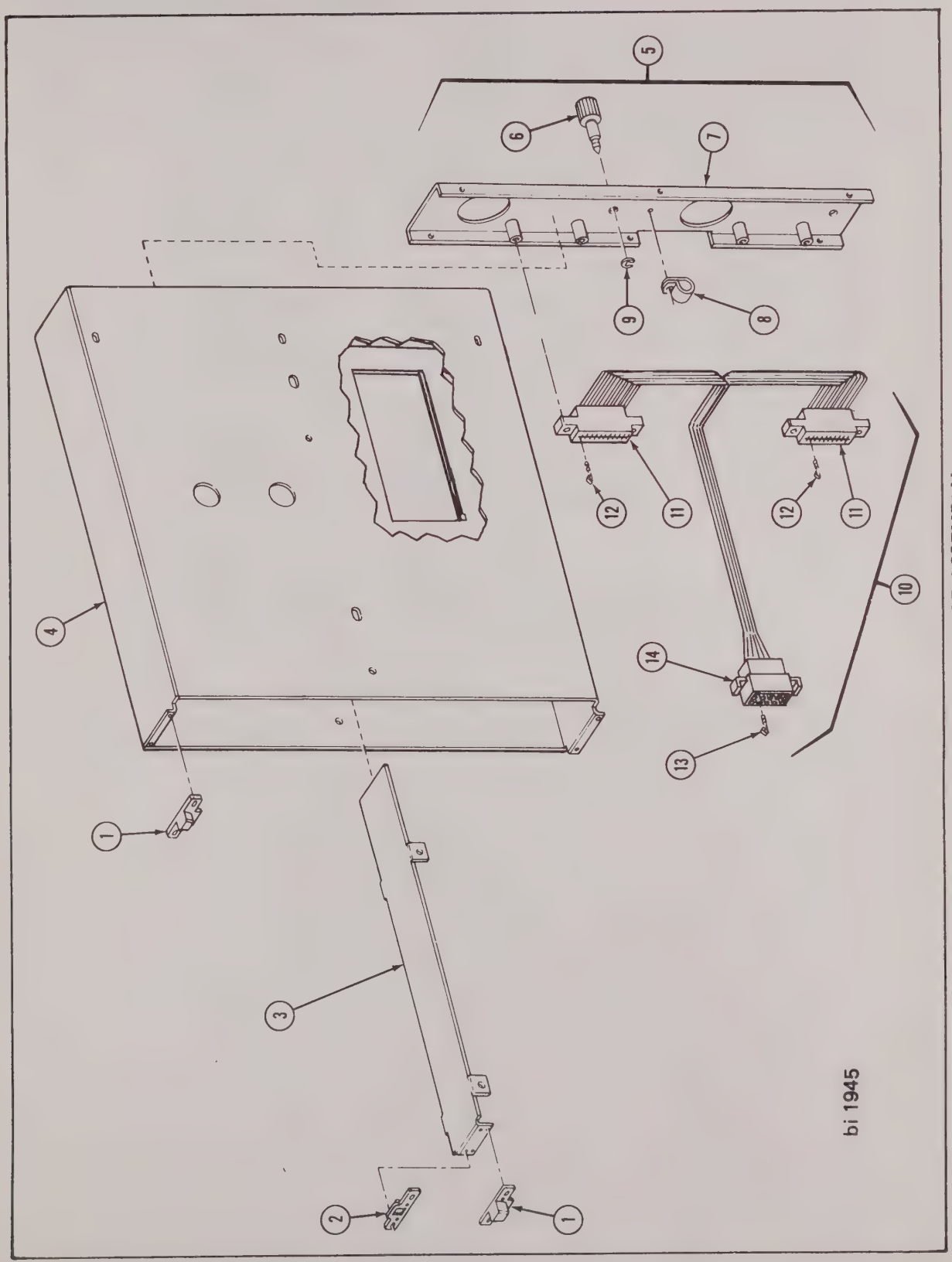


FIGURE 8-16 CAGE ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDER – All Models
CHART TAKE-UP ASSEMBLY 11-6402-13
FIGURE 8-17

ITEM NO	PART NUMBER	DESCRIPTION
1	249617-4	Plate Cover - R
2	243867-12	"O" Ring
3	246651	Roller, Guide
4	246307	Block
5	236865-3	Cotter Pin
6	266046	Pulley
7	9-249640-8206	Screw, Flat Head
8	767254-5	Arm Assembly – L.H.
9	687668	Shaft Assembly
10	247523-117	Plate Ident. Model No.
11	767249-5	Arm Assembly - R.H.
12	249618-4	Plate Cover - L
13	267253	Spring, Compression
14	266184	Shaft, Shouldered
15	667251	Shaft Assembly, Shouldered
16	243696	Retainer, Bearing
17	267257	Pulley
18	31-119918-8208	Screw, Pan Head (Not Shown) For holding Chart Takeup Assy to Recorder

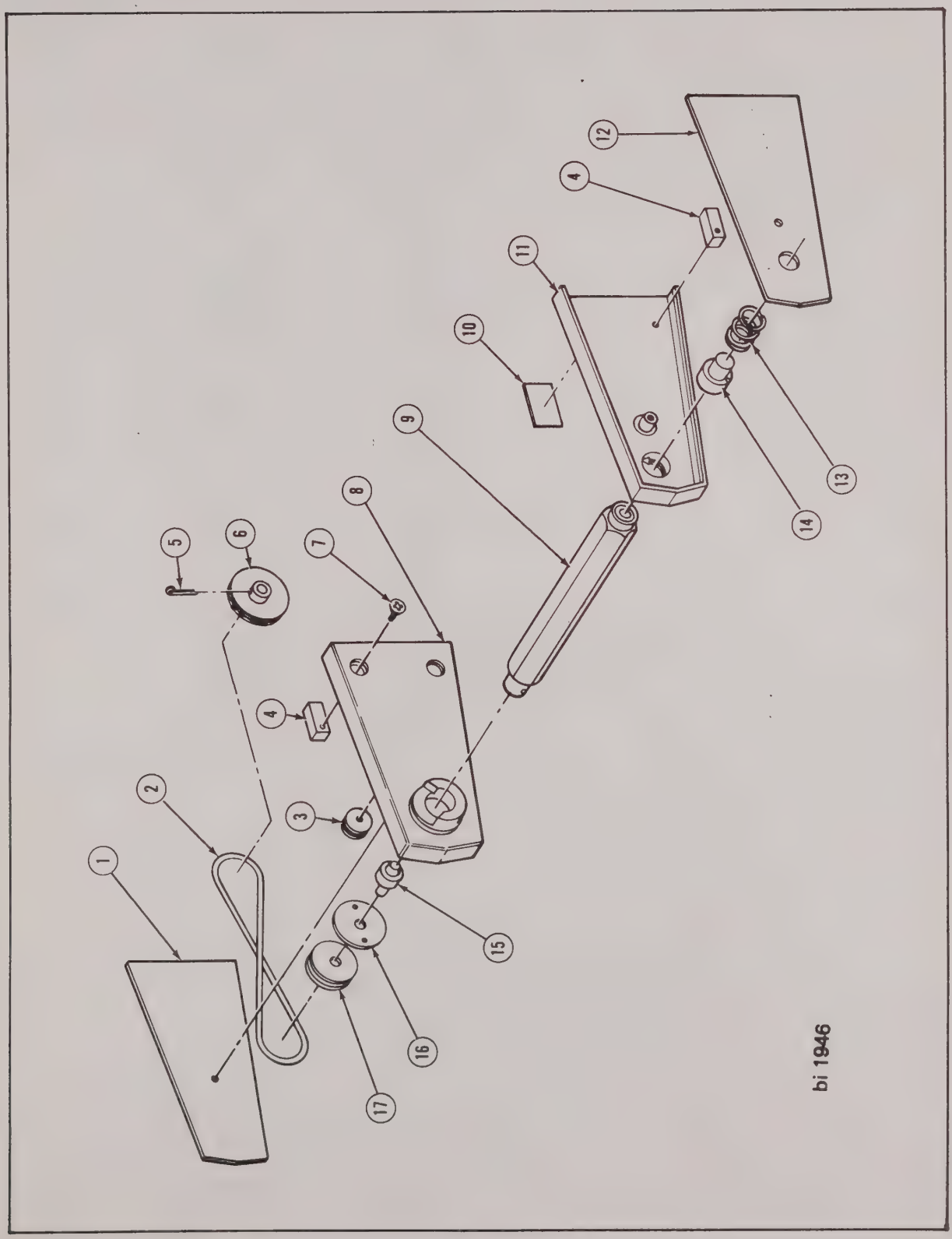


FIGURE 8-17 CHART TAKEUP ASSEMBLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDERS
RACK MOUNT INSTALLATION INSTRUCTIONS--RECORDER ONLY (688007) Kit Model 11-1202-17
FIGURE 8-18

ITEM NO	PART NUMBER	DESCRIPTION
1**	2007-2X90-XX	Recorder Assy
2	31-119998-02	Nut
3	1-216741-430	Lockwasher
4	287011	Bracket
5	31-119918-0208	Screw
6	31-119998-82	Nut
7	1-216741-425	Lockwasher
8	269569-1	Slides, Pair
9	287148	Nut Plate
10	31-119918-8206	Screw
11	287153	Spacer
12	31-119920-0208	Screw
13	487857	Saddle Assy Rack
14	13-262716-4004	Screw
15	387863	Bracket
16	787868	Panel Assy, Front
17	248352-0218	Screw
18	245244-02	Nut
19	Not Used	
20	287653	Spring, Rack Lock
	269569-2	* Front Bracket (Part of item 8)
	269569-3	* Rear Bracket (Part of item 8)
	269569-4	* Nut Bar (Part of item 8)

*Order Separately from item 8.
**Not included with kit.

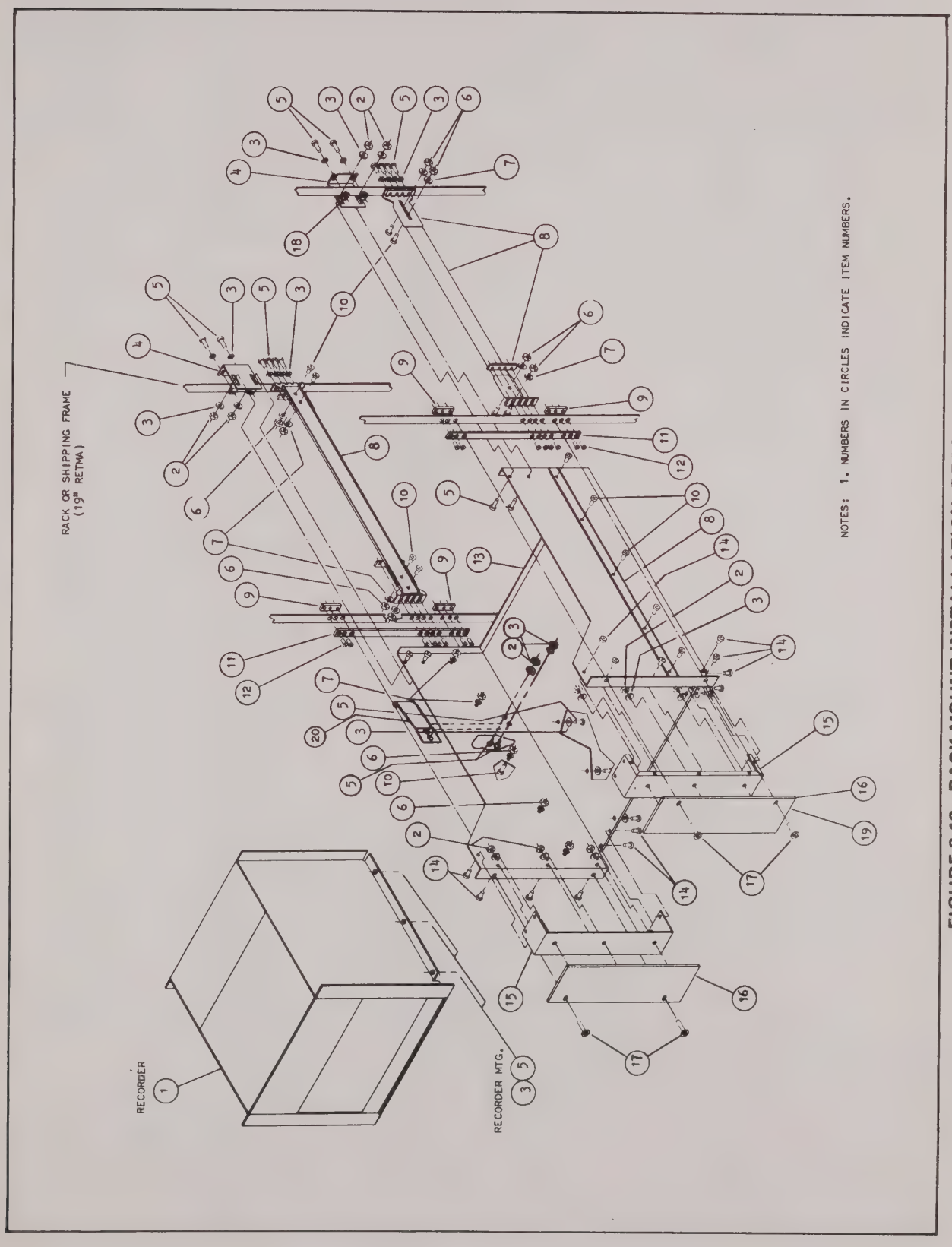


FIGURE 8-18 RACK MOUNT INSTALLATION, RECORDER ONLY

EXPLODED VIEW PARTS LIST
2200 SERIES RECORDERS
RACK MOUNT INSTALLATION INSTRUCTIONS—Recorder with Preamp Cage (688008) Kit Model 11-1202-16
FIGURE 8-19

ITEM NO	PART NUMBER	DESCRIPTION
1**	2007-2X90-XX	Recorder Assy
2	293035	Bracket Support
3	387863	Bracket
4	13-262716-4004	Screw
5	10-120053-101	Lockwasher
6	1-118195-305	Washer, Plain
7**	886494	Cage Assy
8	13-262716-8204	Screw
9	1-216741-425	Lockwasher
10	13-262716-4004	Screw
11	13-262716-8204	Screw
12	10-120053-103	Lockwasher
13	1-216741-430	Lockwasher
14	31-119998-02	Nut
15	31-119998-82	Nut
16	13-262716-4006	Screw
17	31-119918-8206	Screw
18	287148	Nut Plate
19	287153	Spacer
20	31-119920-0208	Screw
21	287856	Bracket
22	31-119918-0208	Screw
23	487857	Saddle Assy, Rack
24	Not Used	
25	Not Used	
26	Not Used	
27	787870	Panel Assy, Front
28	248352-0218	Screw
29	245244-02	Nut
30	287011	Bracket
31	Not Used	
32	287653	Spring, Rack Lock
33	269569-1	Slides, Pair
34	269569-2	Front Bracket
35	269569-3	Rear Bracket
36	269569-4	Bar, Nut

**Not included with Kit.

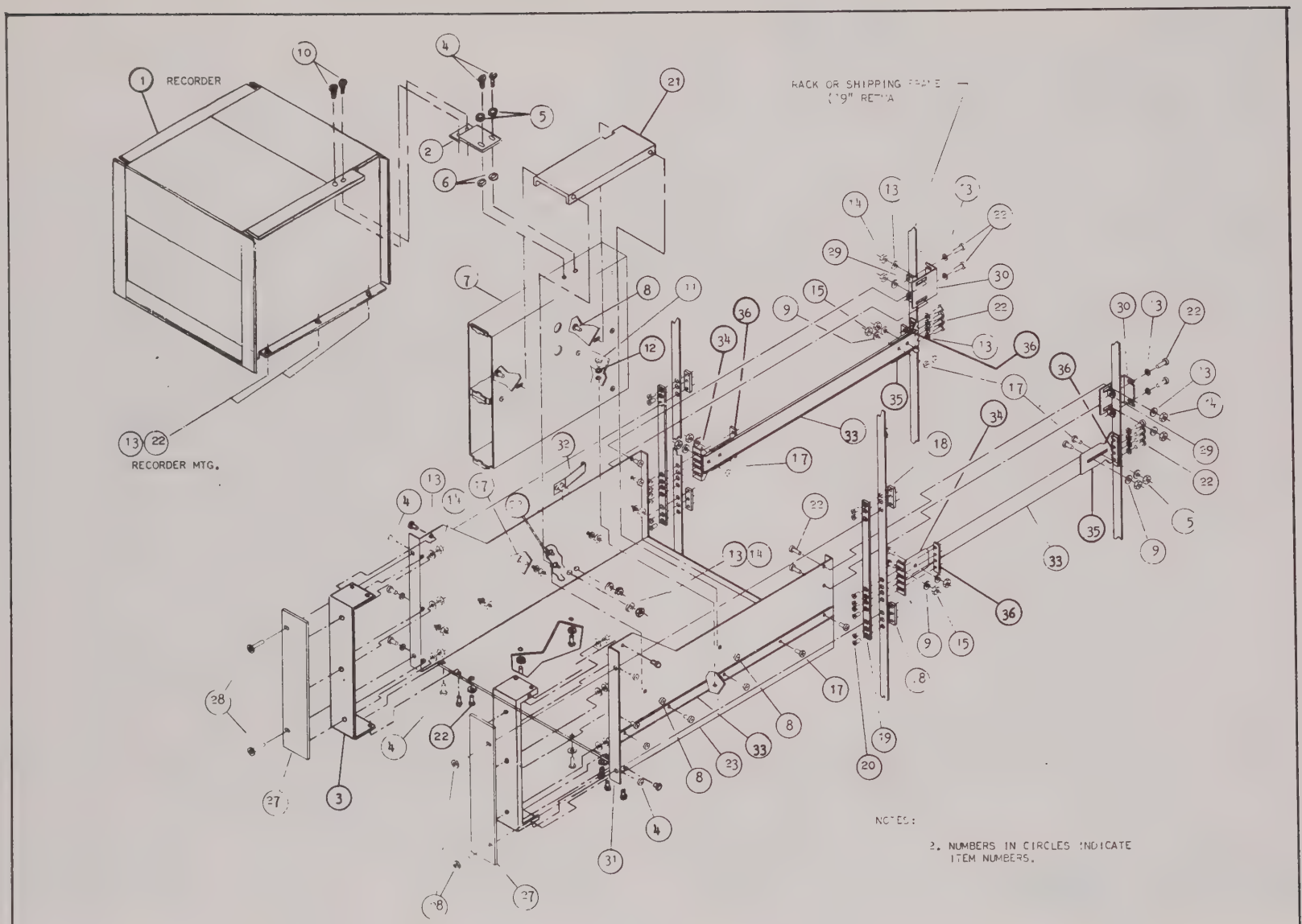
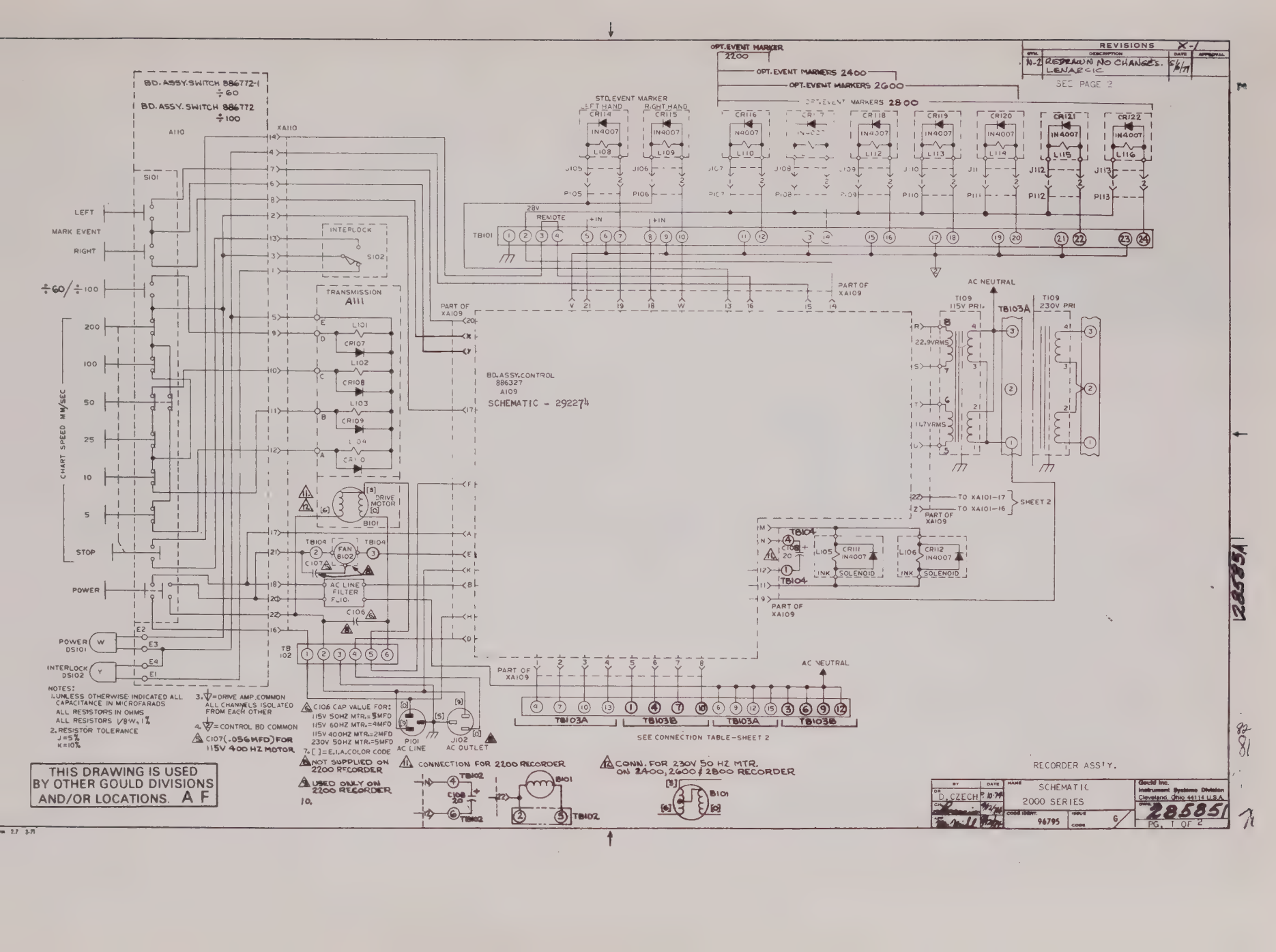
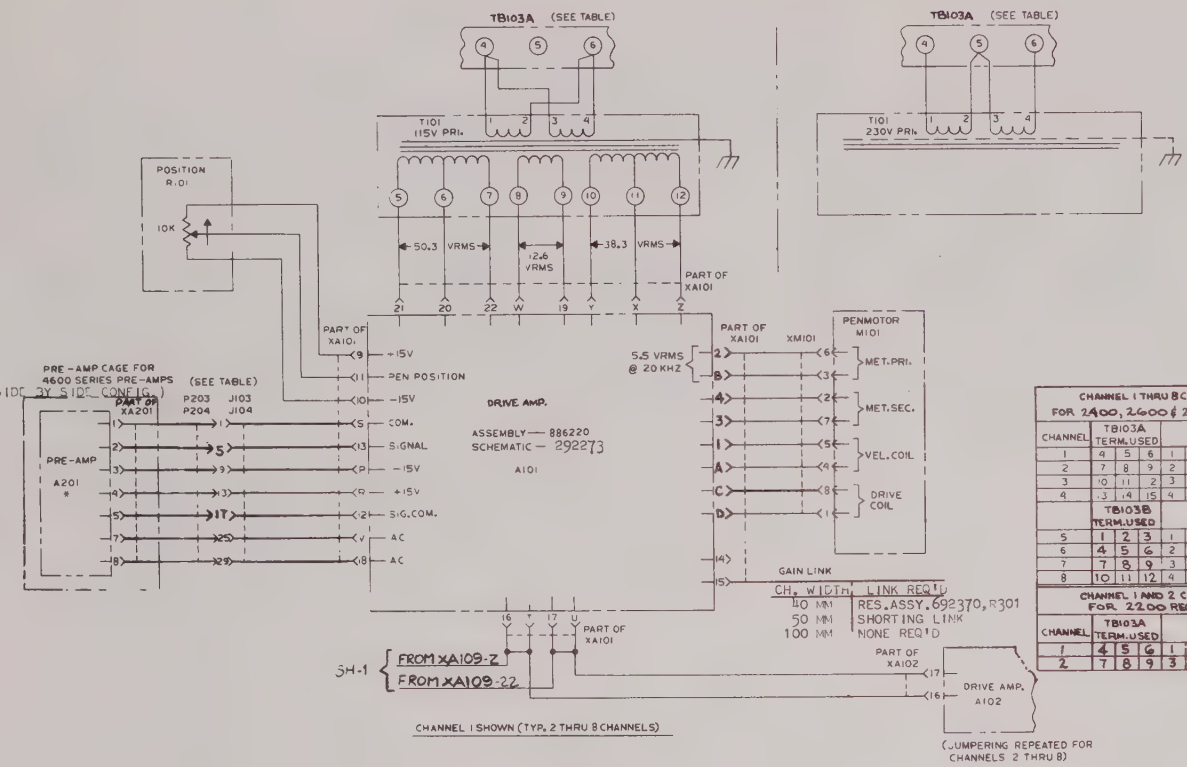


FIGURE 8-19 RACK MOUNT INSTALLATION, RECORDER WITH PREAMP CAGE


REVISIONS
SEE PAGE 2
BD. ASSY. SWITCH 886772-1 ÷60
BD. ASSY. SWITCH 886772 ÷100
OPT. EVENT MARKER 2200
OPT. EVENT MARKERS 2400
OPT. EVENT MARKERS 2600
OPT. EVENT MARKERS 2800
STD. EVENT MARKER
LEFT HAND
RIGHT HAND
LEFT
MARK EVENT
RIGHT
÷60/÷100
CHART SPEED MM/SEC
200
100
50
25
10
5
STOP
POWER
INTERLOCK
TRANSMISSION A111
DRIVE MOTOR B101
FAN B102
AC LINE FILTER
BD. ASSY. CONTROL 886327 A109
SCHEMATIC - 292274
PART OF XA109
TB101
TB102
TB103A
TB103B
TB104
T109 115V PRI.
T109 230V PRI
TB103A
22.9VRMS
11.7VRMS
AC NEUTRAL
TO XA101-17
TO XA101-16
SHEET 2
SEE CONNECTION TABLE-SHEET 2
RECORDER ASS'Y.
NOTES:
1. UNLESS OTHERWISE INDICATED ALL CAPACITANCE IN MICROFARADS
ALL RESISTORS IN OHMS
ALL RESISTORS 1/8W, 1%
2. RESISTOR TOLERANCE
J=5%
K=10%
3. ▽=DRIVE AMP. COMMON ALL CHANNELS ISOLATED FROM EACH OTHER
4. ▽=CONTROL BD COMMON
5. C107(.056MFD) FOR 115V 400 HZ MOTOR
6. C106 CAP VALUE FOR:
115V 50HZ MTR.=5MFD
115V 60HZ MTR.=4MFD
115V 400HZ MTR.=2MFD
230V 50HZ MTR.=5MFD
7. [ ]=E.I.A. COLOR CODE
8. NOT SUPPLIED ON 2200 RECORDER
9. USED ONLY ON 2200 RECORDER
10. CONNECTION FOR 2200 RECORDER
11. CONN. FOR 230V 50 HZ MTR. ON 2400, 2600 & 2800 RECORDER
THIS DRAWING IS USED BY OTHER GOULD DIVISIONS AND/OR LOCATIONS. A F
SCHEMATIC
2000 SERIES
D. CZECH
96795
28585A
PG. 1 OF 2



* FOR 6 & 8 CH. RECORDER RACK MOUNTED CONFIGURATION, SEE WIRING DIAGRAM 292236 (11-7201-15) FOR PREAMP TO DR. AMP. WIRING

CHANNEL 1 THRU 8 CONNECTION TABLE FOR 2400, 2600 & 2800 RECORDER

CHANNEL	TB103A TERM. USED			P203/J103 TERM. USED					
1	4	5	6	1	5	9	13	17	25	29
2	7	8	9	2	6	10	14	18	26	30
3	10	11	2	3	7	11	15	19	27	31
4	13	14	15	4	8	12	16	20	28	32
	TB103B TERM. USED			P204/J104 TERM USED					
5	1	2	3	1	5	9	13	17	25	29
6	4	5	6	2	6	10	14	18	26	30
7	7	8	9	3	7	11	15	19	27	31
8	10	11	12	4	8	12	16	20	28	32

CHANNEL 1 AND 2 CONNECTION TABLE FOR 2200 RECORDER

CHANNEL	TB103A TERM. USED			P203/J103 TERM. USED					
1	4	5	6	1	4	7	10	13	11	14
2	7	8	9	3	6	9	12	15	2	5

REVISIONS			X-1
STYL	DESCRIPTION	DATE	APPROVAL
P-1	ADDED WIRING TO COMPONENT SIDE OF 4600 PRE-AMP. TO 10 TERM. BARRIER STRIP DCN 23090	9/24/71	BAILEY
Q-1	DELETED DIODE CR104 IN4007 DCN 23151	9/23/71	BAILEY
R-1	DELETED WIRE 5 (DRIVE MOTOR B101) DCN 23188	9/24/71	BAILEY
S-1	REVISED PER DCN 24046 D. BAILEY	9/1/76	WK
T-1	REVISED PER DCN 24330		
U-1	REVISED PER DCN 24778 D. BAILEY	9/24/78	WK
V-1	REVISED PER DCN 24977/HAMILTON	8/31/78	
W-1	REV. GAIN LINK DCN 24706 D. BAILEY	11/2/78	
X-1	REVISED PER DCN 24961 D. BAILEY	2/1/79	

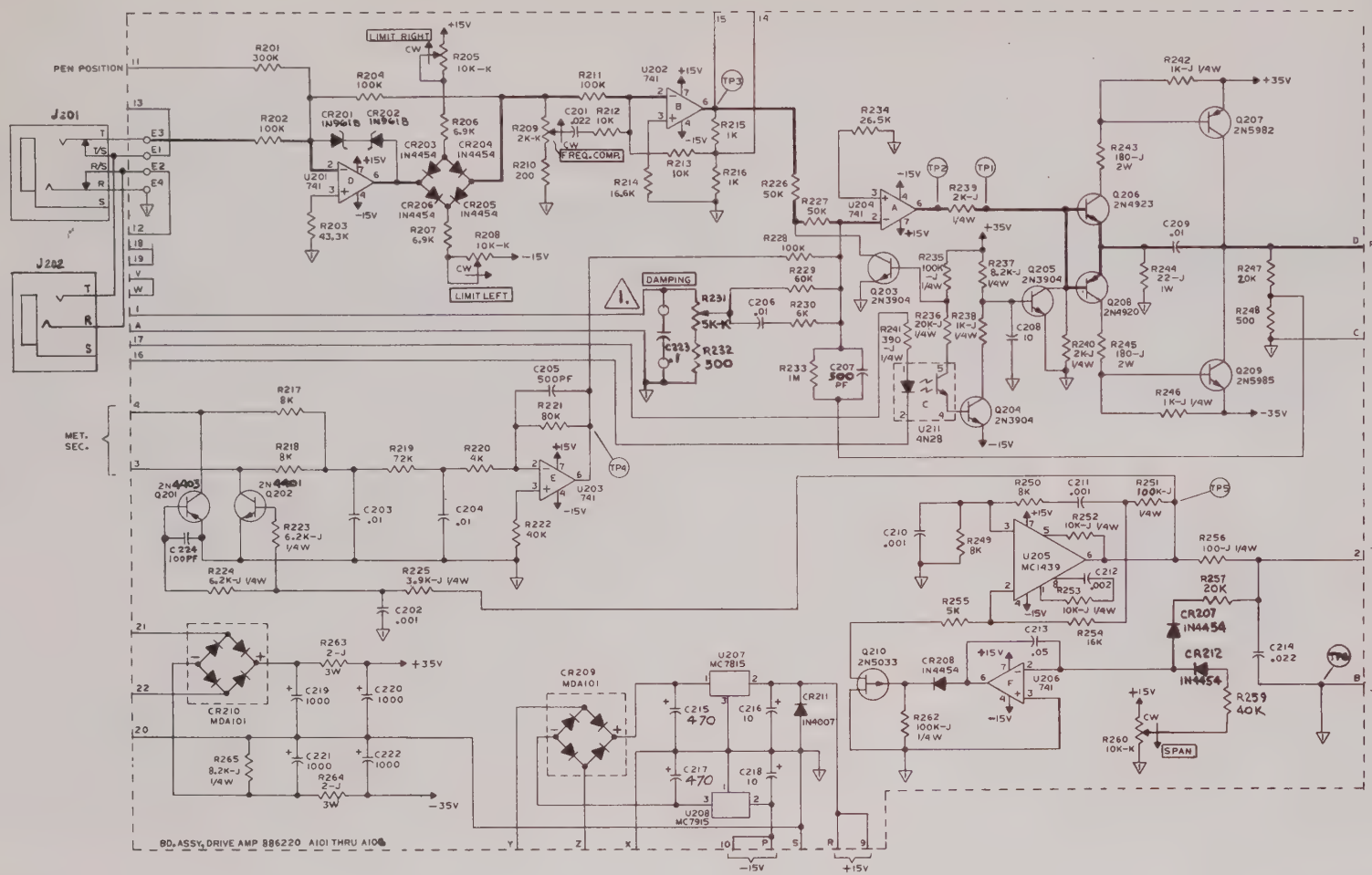
RECORDER ASS'Y.

THIS DRAWING IS USED BY OTHER GOULD DIVISIONS AND/OR LOCATIONS. A F

BY	DATE	NAME	SCHEMATIC
DR. CZECH	9-10-71		2000 SERIES
APP.		CODE IDENT	ISSUE CODE
APP.		96795	G

Gould Inc. Instrument Systems Division Cleveland, Ohio 44114 U.S.A.
DWG. 295851
PG. 2 OF 2

295851



1 C223 USED ONLY IN 80 MM APPLICATIONS.

NOTES:

REVISIONS

SYM	DESCRIPTION	DATE & INITIALS
~~W~~	~~REVISED PER DCN 25183~~	~~5/25/79 CLARK~~
A-1	W1 REVISION IN ERROR PER REISSUE DCN 25183	5/25/79 CLARK
B-1	REVISED PER DCN 25276	6/1/79 CLARK
C-1	ADDED C224 PER DCN 28138/K, HAMILTON	5-19-
D-1	C-215 & C217 VALUE WAS: 500μf PER DCN 27454	10/16/81 JONES

BY	DATE	NAME
DR R. CLARK	9/21	SCHEMATIC AMPLIFIER ASSY. DRIVE 886220
CH	9/79	
APP	9/79	

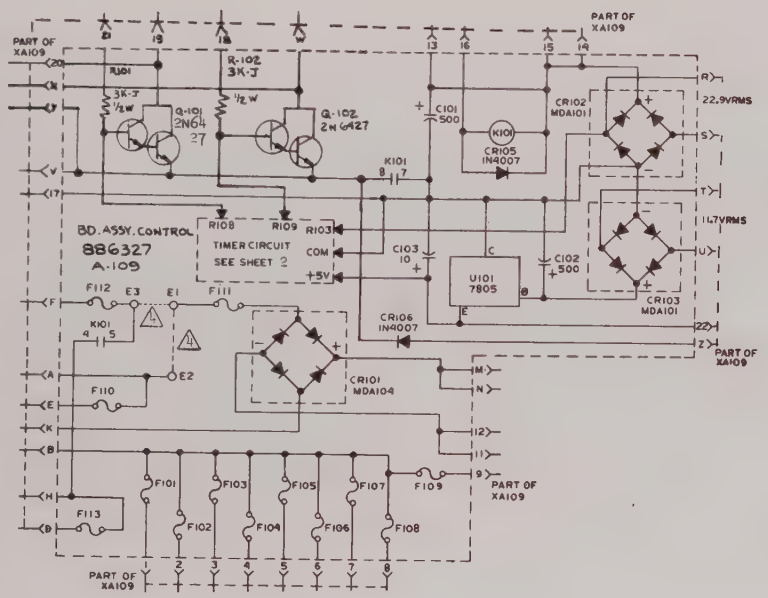
CODE IDENT 96795 | ISSUE CODE G

Gould Inc Instruments Division Cleveland Ohio 44114 U.S.A.

DWG 292273

292273

REVISIONS			
SYM	DESCRIPTION	DATE	
A-1	REVISED PER DCN 25077 K. HAMILTON	3-14-79	
B-1	REVISED SCHEMATIC PER DCN 26095/A. SOTEROS	3-5-80	
B-2	REVISED SCHEMATIC PER REISSUED DCN 26095/ A. SOTEROS	3-6-80	
C-1	ADDED R109 PER DCN 27078/A. SOTEROS	11-10-80	
D-1	RESISTOR VALUE R-109 WAS: 100K. DCN27458 S. JONES	12-30-80	
E-1	REVISED PER DCN 27978 K. HAMILTON	4-13-81	



INK RECORDER FUSE TABLE

FUSE SYMBOL	LINE VOLTAGE & FREQ. 115V 60HZ	115V 400HZ	230V 50HZ	115V 50HZ	COMPONENT FUSED	
F101 - F108	3/4A 125V	3/4A 125V	1/2A 250V	1A 125V	T101-T108	3.
F109	1/4A 125V	1/4 125V	1/4 250V	3/8A 125V	T109	
F110	1/4A 125V	1/4 125V	1/8A 250V	1/4 125V	B102	1.
F111 W/1 INK SOLENOID	1/4A 125V	1/4A 125V	1/8A 250V	1/4A 125V	L105	
F111 W/2 INK SOLENOID	1/2A 125V	1/2A 125V	1/4A 250V	1/2A 125V	L105 L106	
F111	1/8A 125V	——	1/16A 250V	1/8A 125V	L105	2.
F112	2A 125V	——	3/4A 250V	2A 125V	B101	2.
F112	1.5A 125V	2A 125V	3/4A 250V	1.5A 125V	B101	
F113	3A 125V	3A 125V	1.5A 250V	3A 125V	J102	1.

THERMAL FUSE TABLE

FUSE	LINE VOLTAGE & FREQ. 115/60	230/50	115/50	COMP. FUSED	
F101	3/4A	1/2A	1A	T101-T108	
F109	1/4A	1/4A	3/8A	T109	
F110	1/4A	1/8A	1/4A	B102	1.
F111	5A	2-1/2A	5A	PEN HEAT	
F112	2A	1A	2A	B101	2.
F112	1-1/2A	3/4A	1-1/2A	B101	
F113	3A	1-1/2A	3A	J102	1.

3. FOR INK WRITING UNITS PUT JUMPER FROM PIN E3 TO E1. FOR THERMAL WRITING UNITS PLACE JUMPER FROM PIN E1 TO E2.

3. ONLY FUSES SUPPLIED ON MODEL 200 RECORDER.

2. USED ONLY ON 2200 RECORDER.

1. NOT SUPPLIED ON 2200 RECORDER.

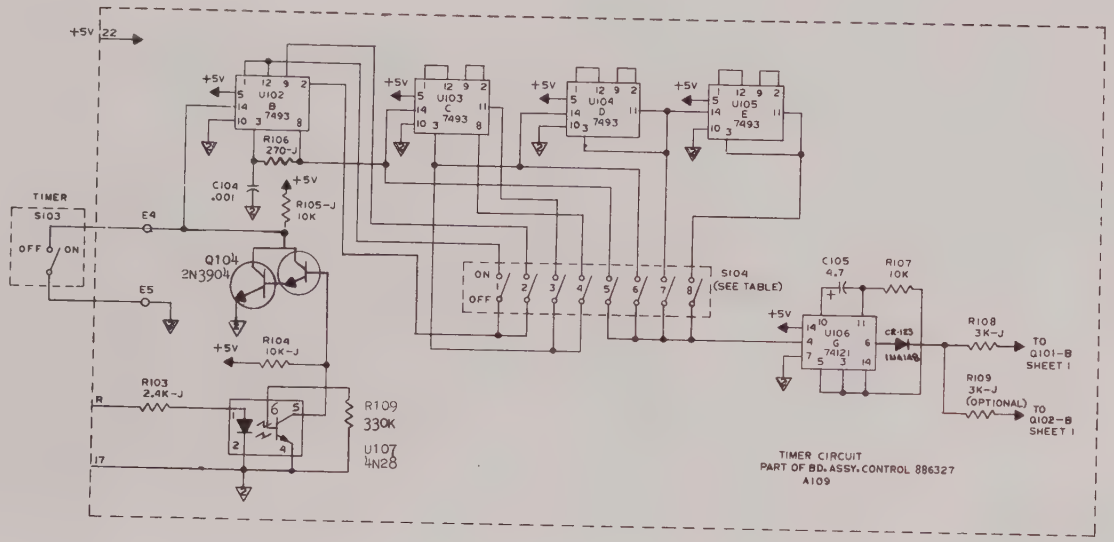
NOTES:

BY	DATE	NAME	SCHEMATIC	Gould Inc Instruments Division Cleveland, Ohio 44114 U.S.A.
DR R. CLARK	1/7/81		BOARD ASSY., CONTROL 886327	
CH Francis	2/19/81	CODE IDENT 96795	ISSUE G	DWG 292274
APP R. Clark	2/27/81	CODE		SC. 1 OF 2

1292741

62
81

REVISIONS		
SYM	DESCRIPTION	DATE



TIMER CIRCUIT
PART OF BD. ASSY. CONTROL 886327
A109

S104 SW. SETTINGS FOR VARIOUS REPETITION RATES

LINE FREQ.	50 HZ		60 HZ		400 HZ	
REP. RATE	SW ON	SW OFF	SW ON	SW OFF	SW ON	SW OFF
.1 SEC	1 3 5	2 4 6 7 8	2 3 5	1 4 6 7 8	3 6	1 2 4 5 7 8
1.0 SEC	1 3 6	2 4 5 7 8	2 3 6	1 4 5 7 8	3 7	1 2 4 5 6 8
10.0 SEC	1 3 7	2 4 5 6 8	2 3 7	1 4 5 6 8	3 8	1 2 4 5 6 7
100.0 SEC	1 3 8	2 4 5 6 7	2 3 8	1 4 5 6 7		
.01 MIN	1 4 6	2 3 5 7 8	2 4 6	1 3 5 7 8	4 7	1 2 3 5 6 8
.10 MIN	1 4 7	2 3 5 6 8	2 4 7	1 3 5 6 8	4 8	1 2 3 5 6 7
1.0 MIN	1 4 8	2 3 5 6 7	2 4 8	1 3 5 6 7		

BY	DATE
R. CLARK	11/1/77
	11/1/77
	11/2/77

NAME: SCHEMATIC BOARD ASSY, CONTROL 886327

Gould Inc
Instruments Division
Cleveland, Ohio 44114 U.S.A.

CODE IDENT: 96795 | ISSUE CODE: 6 | DWG: 292274

PG. 2 OF 2

292274

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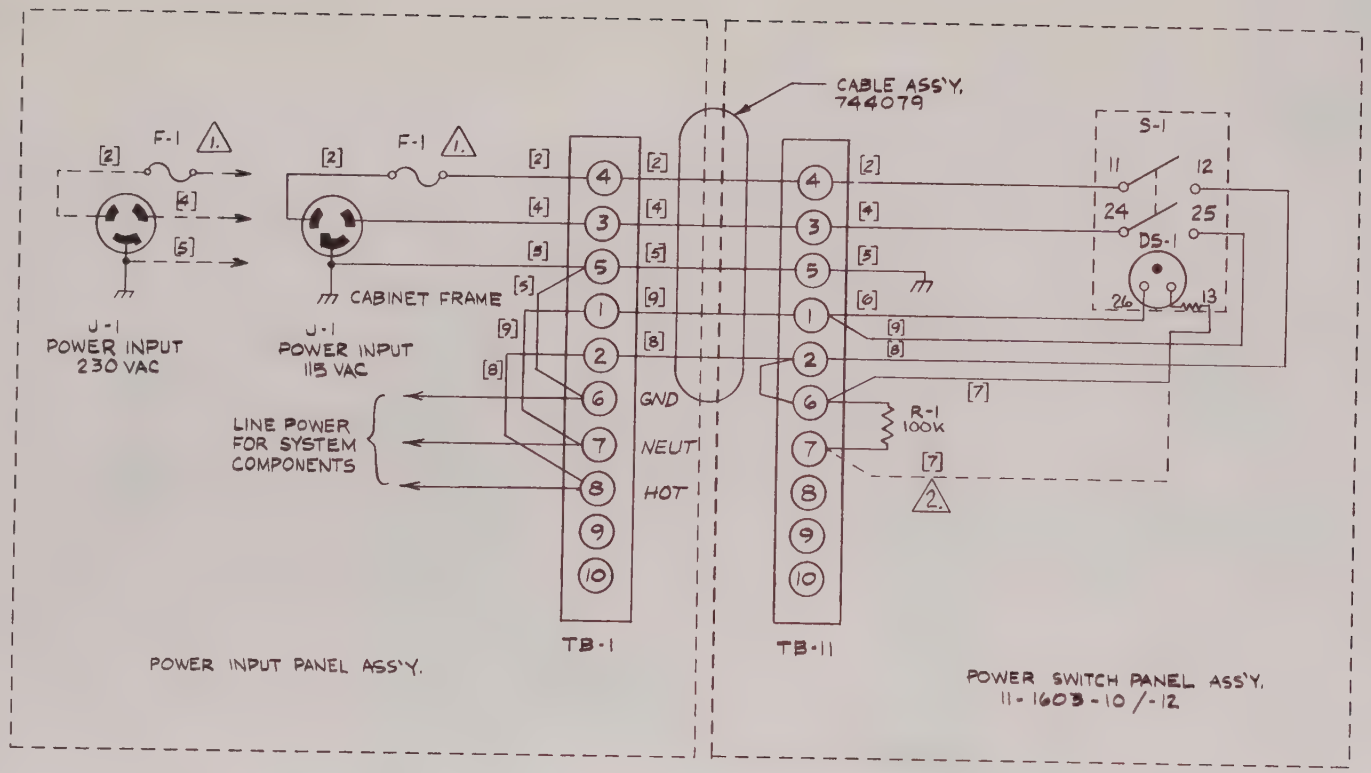
REVISIONS		
SYM.	DESCRIPTION	DA
F-1	REVISED & REDRAWN PER DCN 30078/HAMMOND	11-8-80



3. [ ] = EIA COLOR CODE.

2. FOR 230V OPERATION MOVE WIRE [7] FROM TERMINAL 6 TO TERMINAL 7 OF TB-11.

1. FUSE RATING: 884208-1 & -5 (115 VAC) - 10A
884208-6 (230 VAC) - 5A

NOTES:

REQD	ITEM	PART NUMBER	DESCRIPTION	REMARKS	CK

LIST OF MATERIAL

S-2030

FIRST USE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING
.XXX = ± .006 SURFACE
.XX = ± .015 FINISH
.X = ± .06 ANGLES = ± 0° 30'
SEE WORKMANSHIP STD-TITLED "MFG. TOLERANCES & STD'S.," WHEN DESIRED INTENT IS NOT CLEARLY DEFINED ON DRAWING.

	BY	DATE
DR.	FOWLER	5-25-73
CH.		
APP.	KLOSS	9-17-73

MATL. NONE

NAME: DIA., WIRING - POWER KIT

ADD. FIN. NONE

ISSUE G

CODE

SCALE

Gould Inc.
Instruments Division
Cleveland, Ohio 44114 U.S.A.

DWG. NO. 384919

FED CODE NO 96795

Form 3.19.1.79

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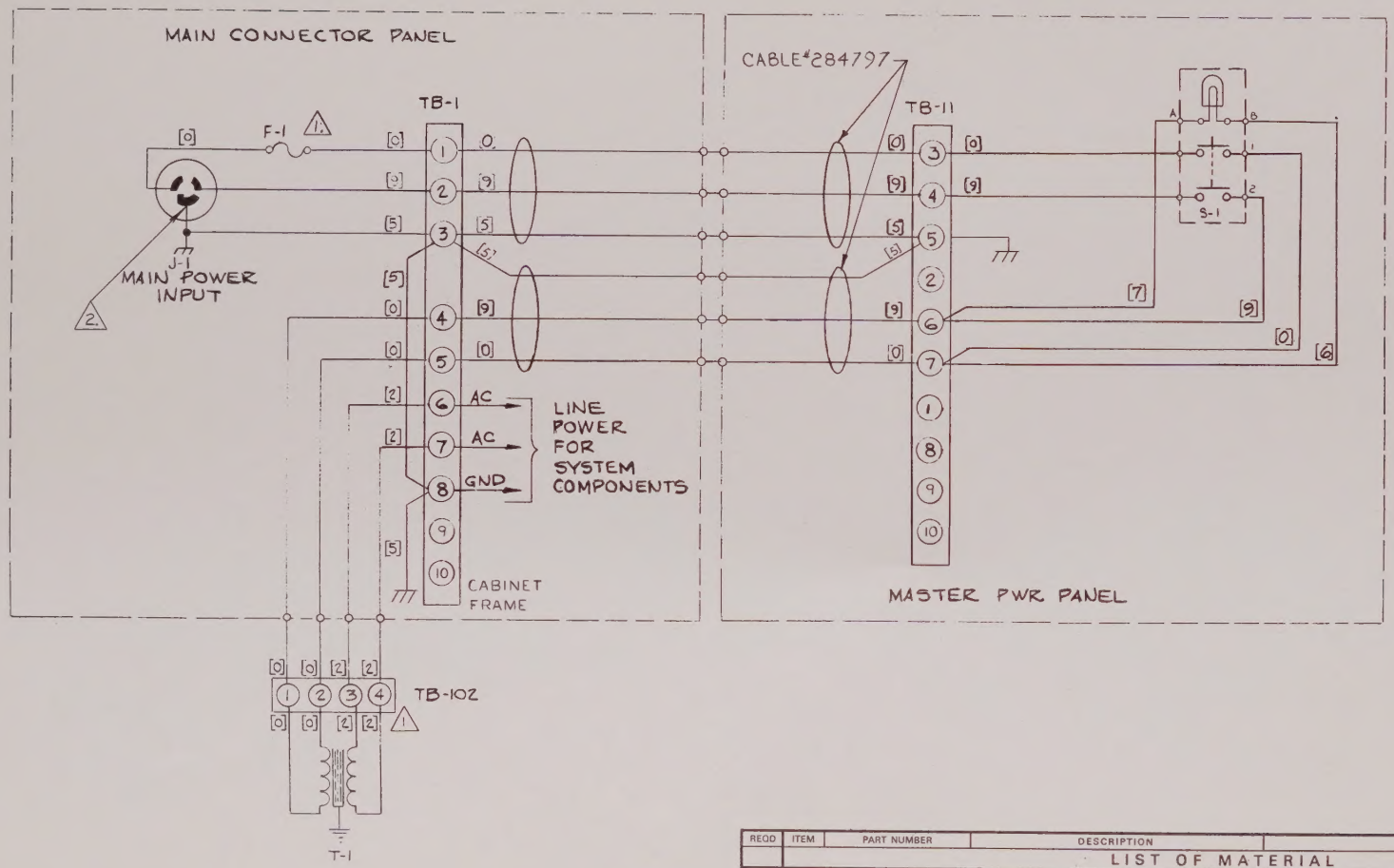
REVISIONS

SYM.	DESCRIPTION	DATE
G-1 G-2	ADDED TERMINALS 9 AND 10 TO TB-1 AND TB-11. REVISED TB-1, PIN 8 WIRING PER D.N. 20575/A. SOTEROS	9-6-79
H-1 H-2 H-3	ADDED NOTE 2 ADDED JUMPER FOR GND. FROM TB-1, PIN 8. ADDED JUMPER FOR GND. FROM TB-11, PIN 5 PER DCN 25612/A. SOTEROS	9-27-79

REPRO 384572 REVISIONS

SYM.	DESCRIPTION	DATE
A-1	884206-2029 REMOVED FROM NAME.	5-21-74
B-1	TIED SECONDARY OF T-1 TO CHASSIS PER DCN #17238 NOV 26 1974 C.F.	11-25-75
C-1	REVISED CB-1 PER DCN 20954 JET	1-13-76
D-1	REVISED MASTER PWR PANEL PER DCN 23298 D.BAILEY	6/20/77
E-1 E-2	DELETED SECONDARY LEAD OF T-1 TO CHASSIS DELETED NOTE 2 (2 SECONDARY LEADS OF TRANSFORMER T-1 HAVE BEEN PHASE TESTED. LABELED LEAD (EITHER FROM PIN #6 OR PIN #7 OF TB-1) HAS BEEN JUMPERED TO CHASSIS GROUND. COMPONENT LEAD CONFIGURATION TO TB-1 SHOULD NOT BE CHANGED." DCN 25232/A HAMILTON	5-3-79
F-1 F-2 F-3 F-4	F-1 WAS CB-1 DCN DELETED NOTE 2 DELETED JUMPER FOR GND. REVISED NOTE 1 (TB-1) D. BAILEY DCN 25327	1-26-79



2. GROUND TERMINAL MUST BE CONNECTED DIRECTLY TO CHASSIS. (USE MTG. SCREW OF J-1.) GROUND LEADS [5] TO TB-1 WILL BE CONNECTED TO THE SAME MTG. SCREW.

1. FOR FUSE & TRANSFORMER CURRENT, VOLTAGE & POWER RATINGS SEE DWG. 884206 SUFFIX (REF.)

REQD	ITEM	PART NUMBER	DESCRIPTION	REMARKS	CML
			LIST OF MATERIAL		

S-2029 FIRST USE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING
.XXX = ± .005 SURFACE
.XX = ± .015 FINISH
.X = ± .06 ANGLES = ± 0° 30'

SEE WORKMANSHIP STD-TITLED "MFG. TOLERANCES & STD'S.." WHEN DESIRED INTENT IS NOT CLEARLY DEFINED ON DRAWING.

	BY	DATE
DR.	FOWLER	5-25-73
CH.		
APP.		6-29-73
ADD. FIN.		

NAME: DIAGRAM WIRING
POWER KIT

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Instrument Systems Division
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